

COAL AGE

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Employment of Women in Mining

By FLOYD W. PARSONS

NEXT to transportation the serious problem in coal mining is the provision of an adequate supply of labor. Approximately 30 per cent. of the male workers in the United States are now engaged in work that was not a part of our industrial effort previous to the entry of this country into the world war. No stretching of the imagination is necessary, therefore, to realize that this shifting of man power must disturb the usual course of business and make it difficult for the Nation to maintain on a normal basis even the production of essential products.

The anthracite coal industry has been hard hit by the voluntary enlistment of its workers and the later drafting of miners into the military service. One partial solution of the problem seemed to be the greater employment of women in various positions above ground. In line with this thought one of the larger companies moved the younger men employed around the jigs in the breakers to work which they could do at and in the mines. The positions vacated by these men were applied for by hundreds of girls when it became known that women would be used. Arrangements were made at each colliery for rest rooms, etc., to give these girls every reasonable comfort and protection. None of them was to replace any boy who could not be moved into a position that would pay him better.

The work that the girls were called on to perform was neither arduous nor dangerous; in fact it was less dangerous than the work in the silk mills, where a large number of them had been employed formerly. The girls were particularly pleased and were glad of the opportunity to make the additional wages that the coal companies paid for this work of running the jigs. The plan gave promise that the coal corporations, with this new help, would be able to provide a sufficient force of jig-runners to prepare the coal on the basis of pre-war standards, which the Fuel Administration now requires, and

which it is difficult to obtain with only a 50 per cent. force.

This hopeful outcome, however, has been prevented by the action of certain labor leaders, who have invoked an old law passed in 1891 which prohibits the employment of women at or around the mines for anything except clerical work. This law has been superseded in practically all of its parts by more recent legislation, but unfortunately the old law was never repealed in its entirety, and this clause concerning the employment of women still remains. The attention of the chief mine inspector of Pennsylvania was called to the law, and he was obliged to issue orders for the suspension of the girls until such time as a ruling on the matter can be obtained from the state's legal department.

The disagreeable phase of the matter is the exultation of a certain element of labor over this outcome. One labor organ calls it a victory, and in this assertion it is correct; for it is a victory—for the Huns. It is a victory for our enemies because, if the jigs in the breakers are not operated fully and effectively, the output of the collieries will not be clean coal; and hundreds of railroad cars will be utilized in the useless work of carrying refuse to market instead of fuel.

The anthracite labor force is so depleted that it will be almost impossible to maintain our last year's output of fresh-mined coal. This recent action, springing from animus and suspicion, was certainly an unnecessary interference with the attempts of the companies to maintain their working forces. It has prevented the use of girls in a class of employment, light in character and carried on under the best of hygienic conditions. It was also a work about which they were enthusiastic, and which they were loath to discontinue. It is fortunate that this local trouble does not typify the attitude of labor throughout the Nation. However, it is deplorable that such selfish and unpatriotic action should have occurred in connection with work so vital just now as the production of anthracite coal.

IDEAS AND SUGGESTIONS

An Improved Jack or Rail Bender

By F. C. J.

The accompanying illustrations show a rail jack or bender—a tool in common use about the coal mines. Referring to the drawing, rail jacks at one time were made in the following manner: A block of iron was first forged into the shape shown in Fig. 1. Then this was chucked in a lathe, the punched hole trued up, and a square thread of about 3 to 4 threads per 1 inch cut. This made the nut part of the jack. The horns, or arms, were then welded to the nut and shaped up in the usual manner. The same operations were gone through when the thread was stripped. The arms were cut off, the nut part was chucked in a lathe, the thread bored out and a new thread cut if sufficient stock remained after boring. If not, a new nut was forged and machined.

The difficulty with this method was that quite often the thread became deformed from the welding and the job was a failure. To overcome this the jack was heated at the bend of the arm and the arm bent backward and inward toward the nut, as in Fig. 2. This made it possible to machine the whole jack, for the arms laid flat on the chuck of the faceplate and did not stick out.

The cutting of a thread in a jack presents many disadvantages, for such jacks often crack or break close to the nut or near the weld. If the former happens, it entails a difficult weld in order to keep from spoiling the nut. Sometimes the nut strips or the thread bar strips as both wear, and it is then necessary to do the expensive forging and machining all over again.

To overcome these defects the jack shown in Fig. 3 was evolved. The jack proper was forged from a solid billet of machinery steel and a 2½-in. hole punched and

other end for a retaining nut. A ¾-in. keyway was then cut on this threaded bushing and also in the drifted hole in the jack. The bushing was then placed in the hole and keyed in place, and the retaining nut screwed up tight. The jack was then ready for the thread bar. The advantages of this jack are at once apparent to all

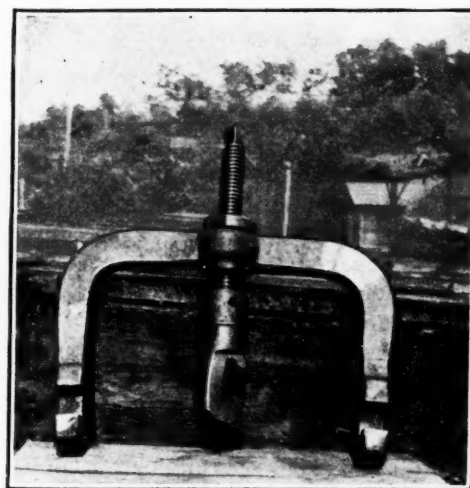


FIG. 3. THE COMPLETED JACK

trackmen. When the thread bar or the bushing strips or becomes worn they are simply taken out and a new part or parts put in place. If the jack should break, the machined parts can be removed and the repairs made without spoiling anything.

Fabric Belt Formula

By W. F. SCHAPHORST
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The rules as ordinarily given for fabric belts made up in plies are something like this: "A 4-ply stitched canvas belt is equivalent to a single leather belt; an 8-ply belt is equivalent to a double leather belt," and so on. Then, after knowing the equivalent, we have to hunt up the rules of thumb for leather belts before being able to decide on a width necessary for a given drive.

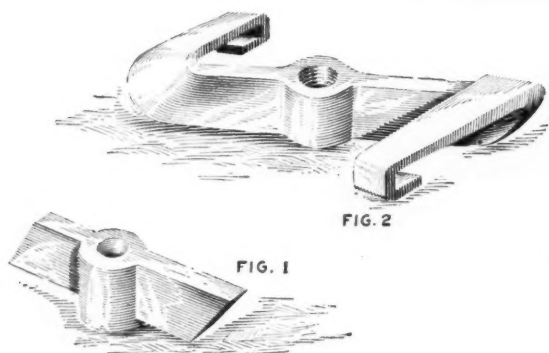
I have hashed over these rules and equivalents and have hit upon a formula that gives a direct result without mentioning leather at all. The formula applies to most ordinary belts made up in plies such as rubber, stitched canvas and balata. It is as follows:

$$\frac{WS}{\frac{2640}{P} + 136} = \text{horsepower} = H$$

where

W = Width of belt in inches;
S = Speed of belt in feet per minute;
P = Number of plies;
H = Horsepower.

For example, what horsepower may be transmitted by



FIGS. 1 AND 2. ORDINARY METHOD OF MAKING A JACK

drifted in place of the threaded nut hole. A bar of 3½ in. diameter machinery steel was then bored and threaded on the inside for the thread bar of the jack. This bar was then turned down on the outside to 2½ in. in diameter, leaving a head on one end of the original 3½ in. diameter. A fine pitch thread was cut on the

a 10-ply balata belt the width of which is 6 in. and whose speed is 4000 feet per minute? Substituting in the formula we get:

$$\frac{6 \times 4000}{\frac{2640}{10} + 136} = 60 \text{ hp.}$$

Thrown into other forms for the determination of either W , S , or P this formula becomes:

$$W = \frac{H}{S} \left(\frac{2640}{P} + 136 \right)$$

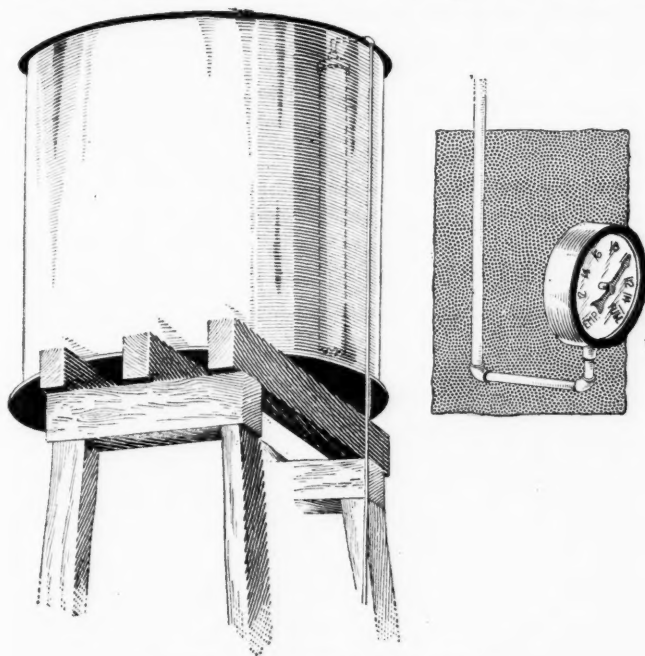
$$S = \frac{H}{W} \left(\frac{2640}{P} + 136 \right)$$

$$P = \frac{2640}{\frac{WS}{H} - 136}$$

Valveless Tank Indicator

BY L. V. LAUTHER
Guttenberg, N. J.

A convenient water-level indicator for a remote water tank can be made as shown in the accompanying illustration. A 4-in. pipe is vertically installed in the tank, on top of which is screwed a 4 x 1-in. reducer, the bottom end of the pipe being left open and supported about an inch from the bottom of the tank. A line of 1/2-in. pipe is run to a convenient point and an old pressure gage attached to it. As the tank fills it is evident that the air entrapped in the 4-in. pipe cannot escape, hence it must undergo compression. As the amount of this compression depends on the height of the water



TANK INDICATOR AND GAGE

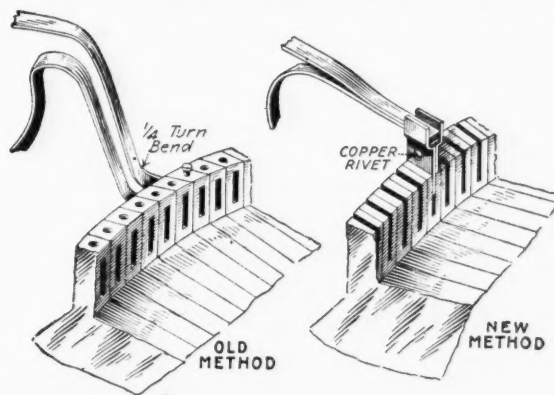
level in the tank, the gage reading will thus increase as the water rises in the tank. A dial was placed on the old gage, and by experiment various heights in the tank are marked upon it as determined by trial.

Where the tank is far from the gage, it is better to incline the big pipe in the tank, so that a greater volume of air is entrapped, thus making up for any drop in the small pipe line. Of course, it is a good plan to go up in the tank once a season and check up on the gage.

Improving the Coil Attachment

BY JOHN J. NOLAN
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The accompanying illustrations show an improvement to prevent the armature leads of certain mining-machine motors from breaking. This is a frequent occurrence on certain types of armatures, especially

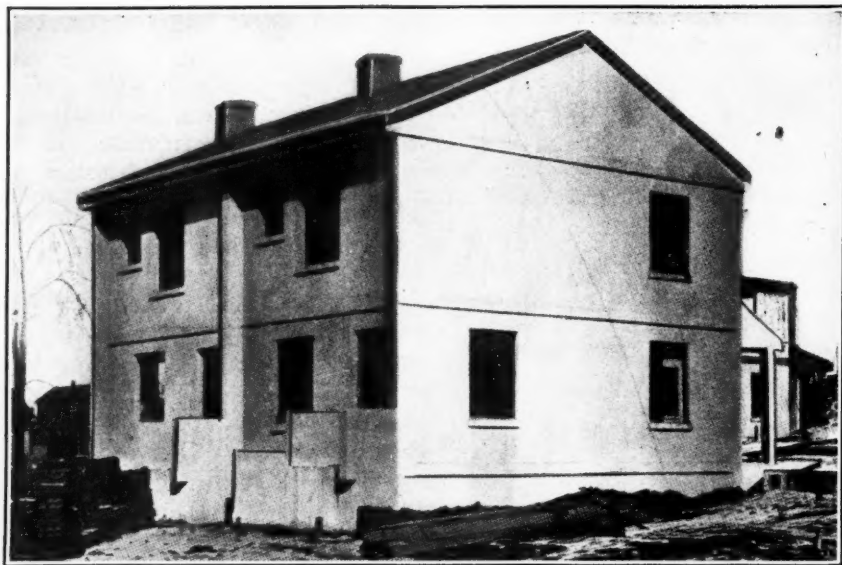


OLD AND NEW METHODS OF ATTACHING COILS

when the wire becomes crystallized after considerable use or the commutator or shaft is loose, causing the leads to break when a bend and one-fourth turn are close together. I have known as high as 30 hook splices being made temporarily by the machine man or electrician before the armature was changed. In most such cases a new commutator is needed.

The company with which I am connected has equipped approximately 12 armatures in the manner shown and has proved them a success. Flat copper ribbon is used, just thick enough to fill the old slot and about 1/2 in. wide, and extending 1 1/2 in. above the riser opened just enough at the top to receive the coil flatwise. The extension riser is double and is riveted near the top, the lower end or single thickness being soldered in the commutator. Under the old method the coil was set on edge and held with a screw. A saving of about 7 lb. of copper is accomplished by this method.

Difficulty in burning bituminous coal in industrial furnaces is due almost entirely to the volatile matter, because this leaves the fuel bed as gases and tars and must be burned in the combustion space of the furnace. Unless enough air is introduced immediately at the surface of the fuel bed and thoroughly mixed with the volatile combustible, the tars and the more complex combustible gases are quickly decomposed or "cracked" into soot and simple gases. The soot thus formed is difficult to burn in the rarefied furnace atmosphere and is apt to pass out of the furnace as black smoke, particularly if the furnace is hand-fired. To prevent smoke and its accompanying heat losses, a considerable excess of air must be used and the furnace must have a large combustion space containing gas-mixing devices. The fixed carbon is easy to burn because it stays on the grade. It burns partly to CO, and partly to CO₂, which in turn can be burned to CO₂, with the additional air introduced above the fuel bed. Practically complete combustion of CO is easily obtained because of its simple molecular structure.—*Bureau of Mines Bulletin No. 135.*



Unit-Built Concrete Dwellings at Youngstown, Ohio*

BY HARVEY WHIPPLE
Detroit, Mich

FORTY acres of fireproof houses and community buildings, in a hill-top setting that has been worked out with an eye as well for attractiveness as utility, are included in the housing scheme of the Youngstown Sheet and Tube Co., East Youngstown, Ohio.

The initial contract was given to the Unit Construction Co., St. Louis, for terraces and double houses, with walls, partitions, floors and chimneys of precast concrete units, to include apartments for 146 families. The work is well under way at this time—began in July, 1917—with buildings already near completion, having ten apartments, and the "parts" cast and in the yard, practically ready for setting up 50 more dwellings. It is proposed to complete the work now under contract in the coming summer.

While the unit method of construction has been successfully applied to industrial structures, to train sheds and in varied applications of the principle, to railway bridges and numerous other works, the Youngstown enterprise is the first use of the Unit Construction Co.'s patents and methods in dwelling house construction.

The first of the Youngstown unit-built houses—the one nearest completion—is shown in the headpiece. Other apartment groups well under way are shown in other illustrations. Fig. 3 shows, in rough outline only, the scheme of this housing development of buildings now under contract to house 146 families. Fig. 4 shows three typical plans.

The Youngstown Sheet and Tube Co.'s operations are large; great numbers of its employees are not thoroughly Americanized; their living conditions are not always conducive either to working efficiency or to the best citizenship. Many of them have to go too far to and from work; many are in crowded quarters, where

houses are so planned as to inflict the necessity—due to their traditional standards of living—of a horde of boarders, to the great detriment of the best domestic development.

To remedy these conditions—to bring the workers closer to their work, to house them comfortably and economically, and under such an arrangement as to minimize the tendency toward overcrowding; to induce a more nearly normal, a more American recreational expansion of the individual, to inculcate a sense of appreciation of the better things in home and community life—with no less ambitious an idea, the problem was



FIGS. 1 AND 2. MIXING PLANT AND CASTING BEDS

*Reprinted from "Concrete," January, 1918, issue.

undertaken by the Youngstown Sheet and Tube Company.

The Buckeye Land Co. was organized; a farm about four miles out from the center of Youngstown was purchased and work was begun. Streets were first laid out, curbed and macadamized, but left without final surface treatment until construction is complete. Sewers were put in, water supply provided. The site is at the top of and on the side of a commanding hill. Grades, therefore, complicated the problem, but they add the feature that must ultimately contribute largely to the attractiveness of the community, in obviating monotony. The variety is enhanced by the irregularity also of the streets, as shown in Fig. 3. While the plans of individual apartments keep very close to the standards shown in Fig. 4, these occur as double houses and as terraces of various lengths, interspersed and not always in a straight line, but with offsets or

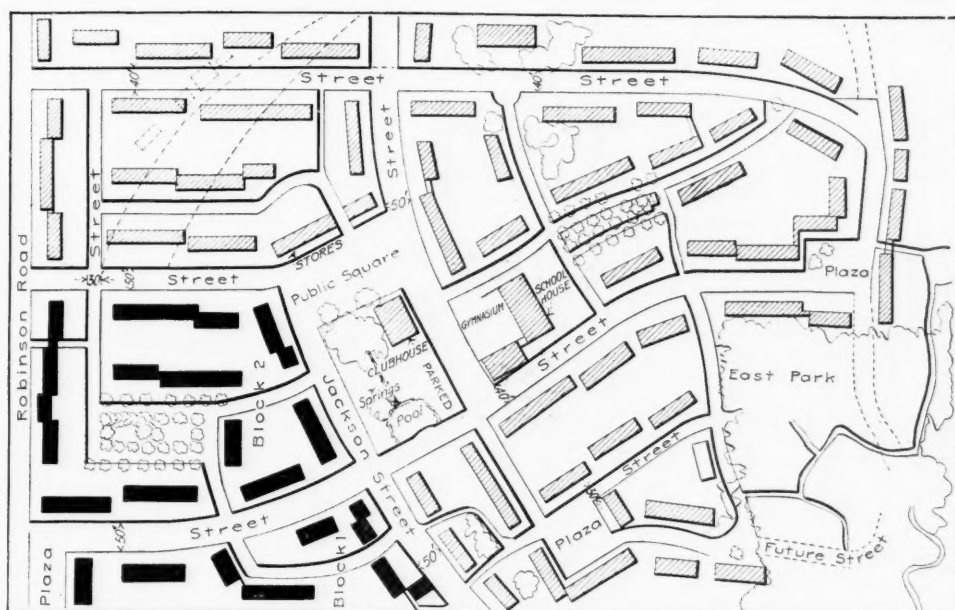


FIG. 3. PLAN SHOWING LAYOUT OF STREETS AND LOCATION OF HOUSES

steps in the front and back line. The variety is still further enhanced by the grades encountered so that in a row of six terraces, floor and roof lines step up 3 ft. for every second house in a row, and with all this variety the units necessary for the construction of the houses are fairly standardized with a very large duplication to



FIG. 4. PLANS OF THREE TYPICAL HOUSES OF YOUNGSTOWN SHEET AND TUBE COMPANY

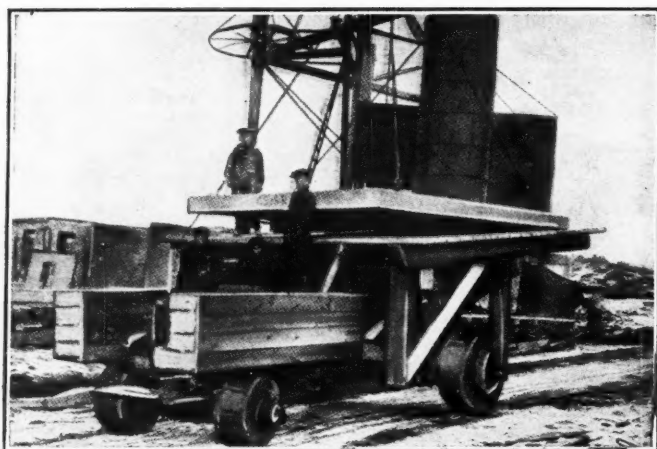


FIG. 5. CRANE LIFTING CONCRETE UNIT FROM "BUS"

effect economy. A single apartment of four rooms, bath, closets, cellar and porches involves less than sixty separate pieces of concrete. One entire wall for a story height comes in one piece; the floor of the largest room, about 16 x 12 ft., is in one slab. Chimneys are hoisted into place in one piece.

The center of manufacturing operations is the mixing plant—a half-yard Ransome mixer, tower, electric hoist and chute, feeding to a car on a tramway, on both sides of which are the casting beds (see Figs. 1 and 2).

Scarcity of good gravel in the vicinity led to the use of slag as the coarse aggregate in the proportion of 1 cement, 2 sand and 4 slag. The cement is about 20 per cent. in excess of good gravel aggregate. Six per cent. of hydrated lime is added.

The concrete is dumped from a 6 cu.ft. push cart, hand operated by two men, on the tramway to short chutes, conveying the mix by gravity to the unit molds on either side of the track, through several hundred feet of casting alleys. As a part of the plant are office building, cement storage building, pumphouse, supplying well water, and a wood working shop.

The houses are of precast units, except for 8-in. footings cast in place. Units are reinforced to sustain the loads in the structure and to withstand the strains in lifting, loading and placing.

Exterior wall slabs are of ribbed design (see Figs. 7 and 8). They are usually of story height and of a length equal to a room or entire side wall dimension. They are rabbeted at the ends so that the adjacent slabs as set provide a space for sealing with grout. At present these slabs are cast with the outside down. Ribs, giving a total maximum wall thickness of 7 in., are formed by boards set in the slab forms. The panels between have a thickness of 3 in. Furring strips, asphaltum painted on the back side, are anchored by nails to ribs when the slab is cast. Partition walls are tubular, the vertical coring being provided by means of form boxes set in the slab forms as the concrete is poured, these being withdrawn, the spaces filled with sand and the other side of the slab troweled on. Sand is removed later by washing with a hose.

Floor slabs are beamed (see floor slab being placed, Fig. 6), the central panels being only 2½ in. thick. These are cast ceiling side down over well finished wood cores designed to give a molded trim around the edge of each panel adjacent to the beams. It will be noted

that floor slabs are so rabbeted at the outer edge as to fit over the wall slabs, anchoring the work (Fig. 8). Window and door openings are rabbeted and provided with wood-nailing blocks, cast in. Sills, to get a better finish, are separately cast. Chimneys are cast vertically with vitrified flue in place, rabbeted to anchor with the unit slabs when grouted in.

Severe cold and snow caught the plant unawares. The casting beds were deep in drifts before a winter shelter could be completed. The present inclosure has plank sides and a hip roof of 8-oz. canvas-covered panels laid on joists. These panels are all readily removable at any place in the sheltered casting area where cured units are to be lifted out. A boiler has been installed and steam pipes run between forms. Laborers spent several days removing snow. A gas blow-torch has been installed in the mixer, and hot gaging water is used. Except in the severest weather, concreting will continue through the winter. Even in such weather, it is anticipated that the temperature within the inclosure will not fall to a point to endanger the integrity of work done.

Hooks for lifting are cast in the units and cured

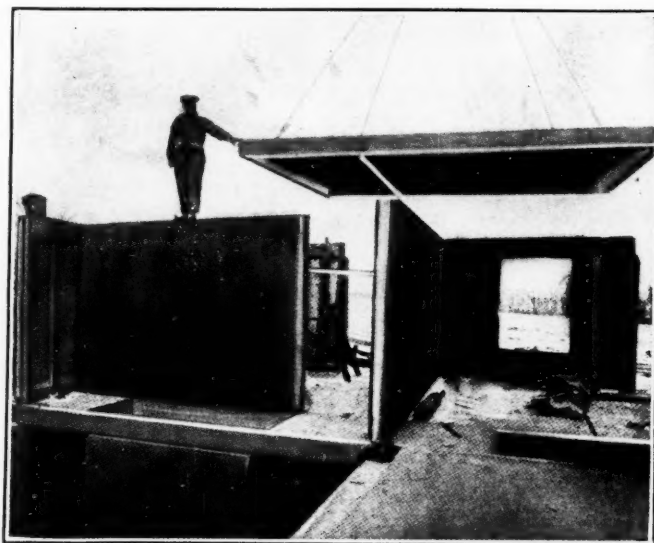


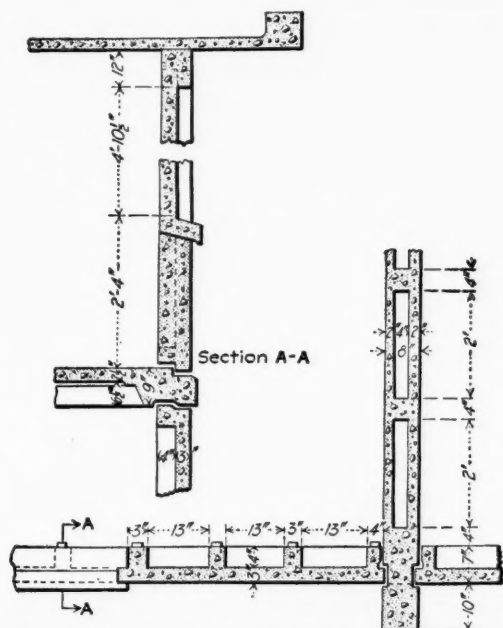
FIG. 6. FLOOR SLAB BEING PLACED IN POSITION

parts are lifted by a locomotive crane, operating on a track throughout the casting area (see Fig. 9) to a "bus." It has wide steel-bound, solid wood wheels, a 40-hp. engine, and a capacity of 11 tons (see Fig. 5). This was largely built on the job. It will take 11 tons of concrete units to a load—some single units weigh as much as 5 tons; travel the ups and downs of the winding roads, and deliver from the casting yard to the farthest corner of the building area, a distance of about 1000 ft., as much as 90 tons a day. A crane operating on rails was regarded out of the question on this particular hillside site. The "bus" solves the problem. At the building site the bus is unloaded by a hoist (see Figs. 7 and 8), each of whose three legs is set on rollers, and counterweighted with gravel by means of the cylindrical hoppers shown in the illustration. A floor unit about to be set by the hoist is shown in Fig. 6.

When the house units are assembled, set, anchored and grouted, the finish is not elaborate. Frames are nailed to the blocks provided at openings, wedged, calked with oakum and plastered over to a neat finish. The

inside surface of exterior walls is lathed and plastered over the furring on the wall ribs; wood floors are laid on sleepers over the unit slabs; interior partition surfaces, plastered exterior wall surfaces and ceilings are painted.

The tubular partitions and the space between sleepers on floors provide space for pipes and conduits. Regis-



FIGS. 7 AND 8. DETAILS OF WALLS AND PARTITIONS

ters are provided in second floor slabs for heat from below. Provision is made for heating with stoves, but a central heating plant is under consideration. There is a bathroom in each apartment, simple but adequate. Stairs are of wood. Exterior walls are given a brush coat of grout (see headpiece), and will be painted with special concrete paint of cream tint. Another note of color will be in the red tile roofs, which are to be laid on wood frame. In spite of this departure from the fireproof material, the fireproofness, to answer most practical purposes, still remains, since a complete fire seal is

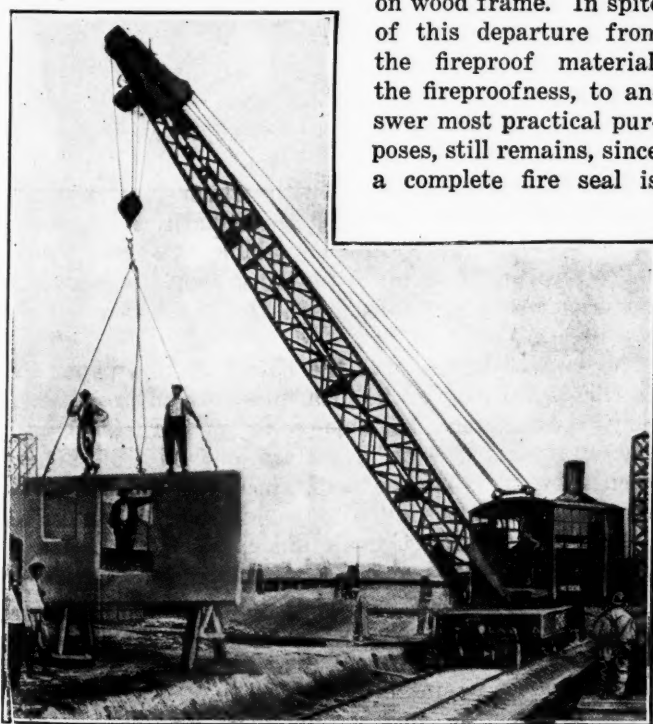


FIG. 9. LOCOMOTIVE CRANE LIFTING SIDE WALL UNIT

provided in the attic floor of concrete. Ventilation of this roof space is provided by metal mesh covered openings under the eaves.

These houses, most of them with two rooms upstairs and two rooms below, with small basements, closets and bath, with garden spaces in the rear and a depth of 18 ft. in front for lawn, are to rent for from \$12 to \$18 per month. With them go liberal plantings of trees, shrubs and vines, shops, public playgrounds, a school, gymnasium, pool and other park and service features as indicated in the general plan.

Alaska Coal No Aid to Pacific Coast Industries

With the Pacific Coast facing a coal famine this winter, the great stores of fuel in Alaska are as far as ever from relieving the situation. For all the good it does, Pacific Coast industrial leaders are satisfied the Government railroad need never have been built. Unless Congress shall enact a more favorable law for the leasing of Alaska coal fields, they are also certain Alaska coal will never be of benefit outside the local demands in the North; and without an export demand the coal tonnage for the new Government railroad will be comparatively unimportant.

The Seattle Chamber of Commerce and Commercial Club has completed statements of fact to accompany its resolutions bearing upon the national need at this time of the development of Alaskan coal and oil resources. The statements are based entirely upon Government reports and include a summary of the British Columbia and Alaska laws. This is graphically shown in the following comparison, which tends to strikingly emphasize the encouragement toward development extended to the pioneers in British Columbia as against the restrictive policy now enforced in the adjoining territory, Alaska.

COAL LAND LAWS COMPARED

Alaska	
Maximum area that may be leased	2,560 acres
Prospecting privilege	None
Rental, first year, per acre	\$0.25
Second, third, fourth and fifth years, per acre	.50
Royalty, first five years, per ton	.02
Next 20 years, per ton	.05
Expenditure, first five years, per acre per year	20.00
Bond required, first five years	Half expenditure
Purchase rights	None
British Columbia	
Maximum area that may be leased	6,400 acres
Prospecting privileges, three years:	
Fees and expenditures per year per acre	\$0.23
Lease privileges, five years:	
Fees and expenditures per year per acre	.23
Rental per year per acre	.15
Purchase per acre	20.00

Though Matanuska coal, tapped by the Anchorage division of the Government railway, is to be ultimately the export coal of Alaska, and is of a high grade quality, there has been no rush for leases. As a matter of fact, advertisements of the Interior Department recently brought no reply.

The Chamber of Commerce also points out that Alaska has the only coal on the entire Pacific Coast suitable for steaming purposes for the Navy; that it has met every test satisfactorily, and that the Navy is now shipping large quantities of coal by rail from West Virginia to the Pacific Coast at a freight cost of over \$9 per ton. It takes from 92 to 100 days for the freight cars to make the round trip.

New Method of Separating Materials of Different Specific Gravities*

By THOMAS M. CHANCE

Consulting Engineer, Washington, D. C.

SYNOPSIS—By using solutions of various specific gravities a perfect separation of slate and sulphur from coal can be obtained. But the solutions are extremely expensive and as they impregnate the coal they are lost in use. Consequently they are undesirable except for tests of washery efficiency. Mr. Chance has found that a mechanical mixture of water and fine sand created and maintained by agitation will have sustention and therefore selection qualities similar to those of a real solution. Such mixtures are made at low cost and do the coal no harm.

ALL gravity methods for the separation of ore from gangue, or of slate and other refuse from coal, are based upon differences in the falling velocities, in some fluid medium such as air or water, of the materials to be separated. As all materials falling in a vacuum have the same velocity, independent of the size, shape, weight or specific gravity of their individual particles, it would be more accurate to describe the operation of these methods as depending upon the retardation of falling velocities effected by the resistance of a fluid medium, this retardation being greater for small or light particles than for large or heavy particles. This generalization is true also of those appliances utilizing centrifugal force to replace or to supplement the action of gravity.

MAKING COAL FLOAT BY THICKENING LIQUID.

The separation of materials of different specific gravities by means of a fluid having a specific gravity greater than that of the lighter particles and less than that of the heavier particles has not been applied commercially, or on a large scale, to the separation of ores or to the washing of coal, the method being limited to laboratory experimental work or to laboratory determinations for the purpose of checking up the work of jigs, classifiers, and other types of concentrating appliances. A solution of zinc chloride has thus come into general use in the laboratory to separate coal, bony coal and slate, both to check up the work of coal-washing plants and for the purpose of making tests preliminary to the designing of coal washers.

The use of a heavy solution of some chemical in water has often been proposed for making such separations, especially in connection with the washing or preparation of coal. Difficulties, that are practically insuperable, however, have prevented the commercial development of any such process, these difficulties being both physical and financial. The cost of the chemical used to make high-gravity solutions is usually prohibi-

tive, and the freeing of the coal from all traces of the chemical is found to be practically impossible. Such solutions inevitably penetrate the individual lumps and particles of coal, transfusing into the pores and saturating the joint-planes, and very large quantities of wash water would be required to free the prepared

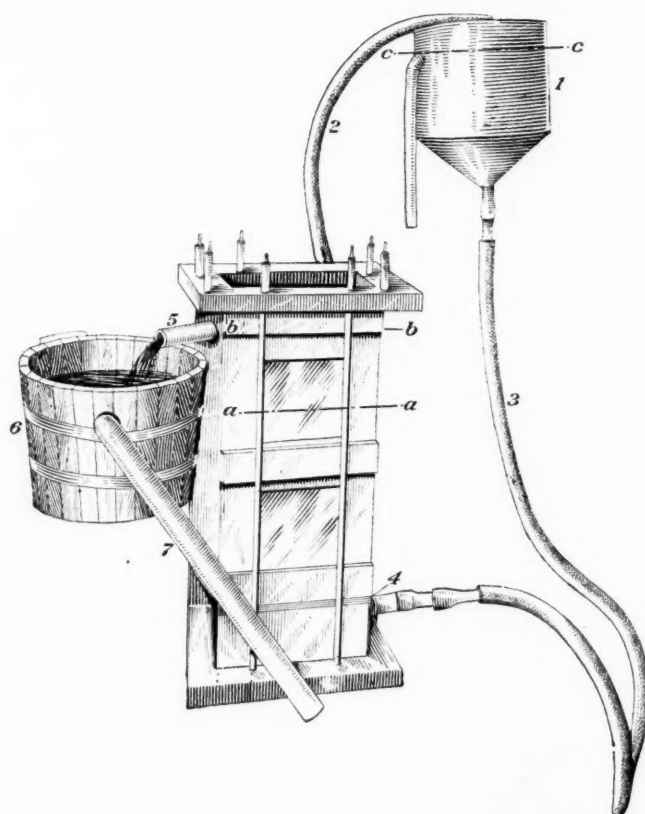


FIG. 1. PERSPECTIVE VIEW OF TESTING APPARATUS

product from the chemical with which it was thus contaminated. The use of large quantities of wash water renders it practically impossible at a reasonable cost to recover the chemical for subsequent use, because this requires concentration of the wash water by evaporation.

The method which it is the object of this paper to describe is based upon the principles that any relatively finely comminuted insoluble solid matter (such as sands), if mixed with a certain quantity of liquid (such as water), can be maintained suspended in the liquid by continuous agitation, and that the mixture, so long as agitation is maintained, will form a mass exhibiting physical properties similar in every respect to those of a fluid of relatively high specific gravity, including its ability to float solid bodies having less specific gravity, while permitting solid bodies of greater specific gravity to sink in it.

The agitation of such a fluid mass may be effected and maintained by any suitable mechanical appliances,

*Abstract of article read before the New York Meeting of American Institute of Mining Engineers, February, 1918. This article receives comment in the editorial section under caption "Chance's Method of Coal Separation."

or by introducing liquid under pressure into the fluid mass, either as jets or as a slowly rising current. When a fluid mass of a certain predetermined specific gravity has been produced in this manner, its specific gravity will remain constant so long as the agitation applied to it is not varied. The specific gravity of the fluid mass will be diminished by increasing the agitation (provided the necessary additional liquid is supplied for dilution of the fluid mass); while its specific gravity will be increased if the agitation be diminished.

It has been found that a mixture of sand and water can be used to produce a fluid mass having a specific gravity suitable for the separation of coal from bony coal, slate, fireclay, pyrite, and other impurities. Sand has been used ranging from 20- or 30-mesh down to 100- or 200-mesh, or even finer, and fluid masses with specific gravities ranging from 1.20 to 1.75 have been easily produced and maintained constant for an indefinite period at any desired gravity within these limits. In the investigations agitation has been effected by stirring arms, by propeller blades, by rotating disks and cones, by hydraulic jets, by upwardly rising liquid, and other means. Combinations of hydraulic and mechanical agitation have also been tried, and it has been found that a very wide range of appliances can be used to produce the desired agitation.

Fluid masses, having specific gravity high enough to float quartz, feldspar, limestone, and other rocks, can readily be produced by using magnetic iron-ore sand and water instead of quartz sand and water. Other heavy materials can be used, such as ore concentrates of galena, metallic copper, etc., for producing fluid masses having very high specific gravities.

PRINCIPLES BEHIND THIS NEW DEPARTURE

For the practical separation of materials of different specific gravities by this method, the following observations are evident:

1. Every particle of material having lower specific gravity than that of the fluid mass will float; that is, the separation will be independent of the size of the materials to be separated. If the fluid mass be contained in a receptacle large enough to permit the introduction of large lumps, it is possible to dump into it the ore or coal, as mined, without any preliminary sizing, whereupon, every particle of less specific gravity than the fluid mass will float, irrespective of its size or shape.

2. As every particle of material, irrespective of its size or shape, having greater specific gravity than the fluid mass, will sink, no preliminary sizing is necessary to insure the sinking of all material having a higher specific gravity than that of the fluid mass.

3. The insoluble material, such as sand, used for producing the fluid mass can readily be washed from the materials which have been so separated, and thus can be recovered and returned to the fluid mass for continuous use.

This method offers facilities for making differential separation of materials which may be of nearly the same specific gravity, because the fluid mass can be so adjusted as to float one material while permitting the other to sink, although the difference in their specific gravities may be slight. This characteristic can be applied to the separation of low-ash coal from high-ash, of coal from bony coal, or of bony coal from slate;

and with ores it may be utilized for separating waste rock from rock that contains sufficient ore to justify crushing and concentration, as well as for the separation of ore-bearing minerals of different specific gravities.

The development of this method has been so recent that it has not yet been introduced commercially, every effort having been directed to perfecting appliances suitable for the operation of the method. It is evident that such apparatus may be built in a great many different forms. Much experimental work has been done to determine the conditions under which a satisfactory agitation of the fluid mass can be obtained and maintained, but no difficulty has been found in securing the desired results with many different types of agitators.

An apparatus in which "float and sink" tests may readily be made on coal, bony coal and slate, is shown in Fig. 1, and a working drawing is shown in Fig. 2. The apparatus consists of a vertical box open at the top, 6 in. wide by 8 in. long and 20 in. high. The bottom is closed by a brass plate (4) $\frac{1}{8}$ in. thick, having 48 round holes of $\frac{1}{16}$ -in. diameter, spaced 1 in. apart. Below this brass plate is a water-tight box supplied with water under pressure from the tank 1, which receives water from a supply hose 2, and delivers it through the hose 3 to the box below the brass plate. These two boxes are fastened together with eight bolts

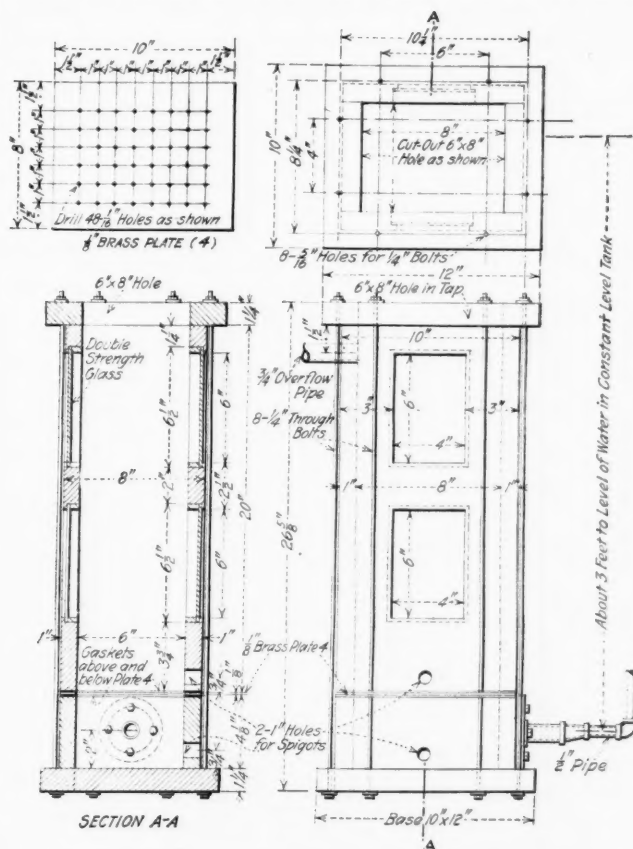


FIG. 2. WORKING DRAWING OF APPARATUS

running from top to bottom, and the joint at the brass plate is made water-tight by gaskets. The vertical box is provided with two glass windows and with an overflow pipe 5 emptying into the bucket 6, in which any sand carried out by the overflow may settle; the bucket has an overflow pipe 7 through which the water is discharged.

The water in the tank 1 is maintained at constant level *cc* by the overflow pipe and hose 8, so that the effective hydraulic head, the vertical distance between the overflow lines *bb* and *cc* is maintained constant, but can be adjusted by raising or lowering the tank 1. If the tank 1 be raised, increasing the agitation, the level of the fluid mass *aa* rises and the specific gravity of the fluid mass is correspondingly reduced; if the tank 1 be lowered, diminishing the agitation, the level of the fluid mass sinks below the line *aa*, correspondingly increasing its specific gravity.

In an apparatus of this type, agitation being effected by hydraulic water alone, it has been found that with mixed sands averaging 80 mesh, and working under a relatively low head, efficient agitation may be obtained by the use of 3 to 10 gal. of water per minute per square foot of superficial area of the apparatus. When mechanical agitation is used in combination with hydraulic water, the quantity of water can be reduced.

The importance of this method as applied to coal washing is illustrated by Fig. 3, which shows the theoretical increase in specific gravity of bituminous coal due to the presence of ash and sulphur (present as pyrite). The specific gravity of coal is naturally increased more by high sulphur percentages (due to

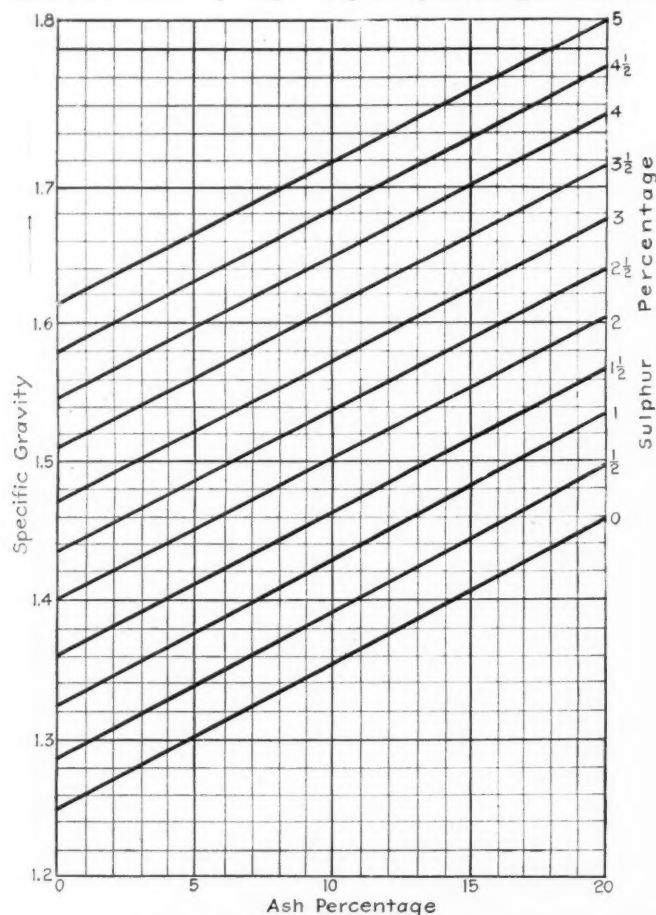


FIG. 3. CHART RELATING SPECIFIC GRAVITY OF COAL WITH PERCENTAGE OF ASH AND SULPHUR

(Based on following factors: Pure coal, specific gravity = 1.25. Clay ash, specific gravity = 2.3. Sulphur, 1 per cent. = 2 per cent. FeS_2 , having specific gravity = 4.9.)

the high specific gravity of the pyrite) than by high ash. Thus an "ash-free" coal containing 3 per cent. of (pyritic) sulphur will have a specific gravity of about 1.47, while a "sulphur-free" coal with 20 per cent. of ash would have a specific gravity of 1.46.

As coal of relatively light specific gravity is low in both ash and (pyritic) sulphur, the method offers a means for separating pure coal from that which is relatively impure, without fine crushing of the whole mine product. Assuming the machine be set to produce a fluid mass of 1.40 specific gravity, and bituminous

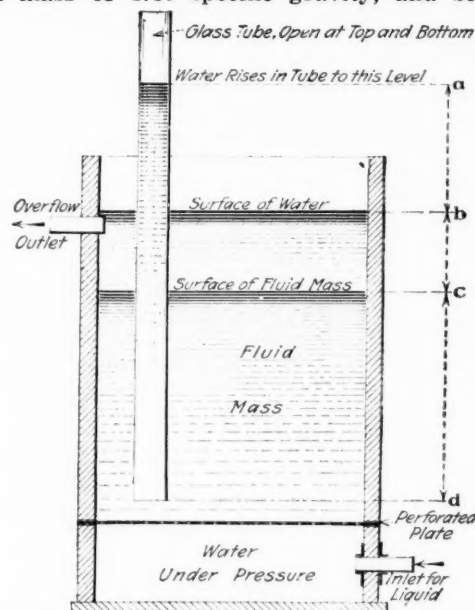


FIG. 4. DIAGRAM SHOWING HOW SPECIFIC GRAVITY CAN BE READILY DETERMINED

coal (run-of-mine) be fed into the washer, every lump and particle of low-ash and low-sulphur coal will float, while every lump and particle of high-ash and high-sulphur coal will sink, together with all the bony coal, slate, pyrite and fireclay. The coal that floats is a very high-grade finished product. The material that sinks can be removed and passed into a second washer, in which the fluid mass is maintained at a specific gravity of, say, 1.60. Here all the slate, fireclay and pyrite sinks, and also the very high-sulphur (4 to 6 per cent.) and very high-ash (15 to 20 per cent. ash) coal, but all the coal of intermediate density will float and constitute a product suitable for general use. If it be desired to improve the intermediate product, this can be done by crushing and subsequent separation in the same or another machine.

In presenting the foregoing paper for the author, who is now in the National service, H. M. Chance showed a working model. For more convenient operation, a small motor-driven centrifugal pump was attached to the overflow outlet pipe 5, Fig. 1, delivering to the inlet 4. The pressure of ingoing water was then adjusted by a valve at 4, and was indicated by the column of water in a vertical glass tube connecting with the pressure chamber. An average pressure of 15 in. of water column was maintained during the demonstration.

The sand used in the test was beach sand, sized by passing through a 20-mesh screen; about 45 per cent. was finer than 80 mesh. The circulation of water was at the rate of about 5 gal. per square foot per minute, and the rising velocity of the water in the box as a whole (not the velocity of the jets) was 6 in. per minute. At this consistency, the specific gravity of the fluid mass was between 1.55 and 1.60.

Mr. Chance estimated that it would be possible to maintain a fluid mass of this consistency, 3 ft. deep, and with an area of 50 x 60 ft. with an expenditure of 15 hp. He then showed how a lump of coal would float on the fluid mass, and also made a separation of slate from coal on a small scale in a wire cage submerged momentarily in the fluid.

Upon immersing a tube, open top and bottom, a certain depth in the fluid mass, the tube is at first filled with the fluid mass and superincumbent water, the water at first standing within the tube at the level *b*, coinciding with the top of the water in the apparatus. After a few minutes the water within the tube rises to the level *a*. This phenomenon is due to the fact that there is no agitation within the tube to prevent the sand from settling, because the tube has no overflow. The sand therefore drops through the tube, settling to the bottom and joining the fluid mass external to the tube, so that the whole tube from the bottom up to *a* becomes filled with water, being sustained at the height *a* by the hydrostatic pressure exerted by the greater specific gravity of the fluid mass.

It is clearly evident that that part of the column of water between *b* and *c* is counterpoised by the water exterior to the tube between the same levels, so that we may neglect this part of the column as having no effect. We are therefore concerned only with the depth of water within the tube between *a* and *b*, and *d*.

$$\text{Sp.gr. of fluid mass} = \frac{cd + ab}{cd}$$

For example, if *cd* is 10 in. or 10 ft., and *ab* is 6 in. or 6 ft., sp.gr. = $(10 + 6) \div 10 = 1.60$.

The weight of the solids (held in suspension by agitation) from *c* to *d* is equal to the weight of the column of water from *a* to *b*, irrespective of the specific gravity of the solid matter held in suspension. The depth of water, *b* to *c*, may vary from zero to any desired depth.

Not only can the specific gravity of the fluid mass be determined by this method, but the *actual weight* of the materials held in suspension by agitation, irrespective of the specific gravities of the individual particles (which may vary widely) is exactly equal to the weight of a column of water between *a* and *b*. It will also be noted that this method of measuring specific gravity of an agitated fluid mass gives the average specific gravity from the top to the bottom of the mass; whereas the hydrometer method in common use gives the specific gravity at the depth to which the hydrometer is immersed. In many cases in treatment of ore pulps the specific gravity of a fluid mass may be considerably greater at the bottom than at the top.

It will be evident that the specific gravity of such a fluid mass, and also the weight of the solid matter held in suspension in such mass, can be measured by a pipe or tube *external* to the tank containing the pulp. All that is necessary is to insert a pipe near the bottom of such tank, extending up vertically a sufficient distance above the top of the receptacle. It may also be noted that if the pulp contains considerable quantities of colloidal material, that such pipe can be kept free from this and continuously filled with *clear water* by feeding a small stream of clear water into the top of the pipe.

Britain's Pocketed Coal Mines*

By DON J. O'BYRNE

Since the war began Great Britain has been learning many lessons in efficiency, but the most expensive lesson of all comes from the questionable manner in which her coal industries were discouraged. "Carrying coals to Newcastle" was in pre-war times as axiomatic of doing something absurdly unnecessary as anything that could be imagined. Indeed it was an English boast a quarter of a century ago that her mines could supply the coal needs of all Europe, but this ready boast has not been justified by the experience of the present war.

And the main reason why it has not stood the test of time is not the lack of coal but the favoritism displayed in furnishing the necessary mining advantages to certain fields. If a noble lord had coal on his lands it was an easy matter for him to have a railroad pass his way, to form a company for operating purposes and reap his harvest in dividends. If a small landowner discovered coal it would be this same noble lord who would make it his business to see that he could not operate as a competitor.

He would make sure that the railroad would detour instead of passing near the small fellow's holdings and, by preventing a possible outlet, annihilate competition. There are hundreds of tracts of coal lands in Great Britain and Ireland that have been treated in this fashion. One of the most flagrant examples is found in the Castlecomer fields in Kilkenny, Ireland.

Castlecomer is a small town of about 1000 inhabitants. Under the town and running for a mile in each direction is one of the beds that has been noted by mining engineers, but when the railroads were being built, and the particular brand of favoritism referred to was going around, this rich mineral bed was left in a pocket, so to speak. Walk or drive any direction from Castlecomer and you must travel from six to eight miles before you will reach a railroad, and you can inquire until your tongue grows tired but no one can furnish any logical reason why the Great Southern and Western railroad detoured six miles from a straight line (from Dublin to Kilkenny) in order to avoid Castlecomer and go through the agricultural town of Ballyragget.

An extraordinarily unfair piece of railroad engineering left the Castlecomer mines practically dead. In a desultory fashion the Welsh owners of the mines have operated them now and again but never with any degree of profit. Full of ambition the Flewellyns and the Llewellyns left their native Wales for this Irish El Dorado seventy years ago. Today the grandchildren of those hardy miners till the soil in the spring, summer and autumn and do a little mining in the winter. They haul their product in donkey-drawn carts to Kilkenny, Carlow or Ballyragget (about half a ton to a load) and exchange it for merchandise. An effort is now being made to have the government bring the outer world and the Castlecomer mines together.

Who will operate the mine? The Flewellyns and the Llewellyns say they will take no chances. They are farmers first and miners last in this generation. The country faces a grave economic question now, where it should have an efficient industrial organization.

*Editorial under same caption appears in this issue.

*Byproduct Coke and Coking Operations**

BY
C. J. RAMSBURG †
AND
F. W. SPERR, Jr. ‡

Third Installment

STUDIES of the character of this article will be largely of academic interest unless correlated with studies of the behavior of different types of coke in the blast furnace and in other types of apparatus in which the material is used. Let us choose the blast furnace for consideration here on account of its tremendous industrial importance.

There is at present some disagreement among blast-furnace men as to the exact function of the coke in the most efficient and economical reduction of iron ore. The majority probably still accept Grüner's theory of ideal working; namely, (as stated by Richards'), "All the carbon burnt in the furnace should first be oxidized at the tuyeres to CO (carbon monoxide), and all reduction of oxides above the tuyeres should be caused by CO, which thus becomes CO₂ (carbon dioxide)." It is well known that the reduction of iron oxide by carbon monoxide is the most efficient from the standpoint of heat economy. Richards, however, has pointed out that the direct reduction of iron oxide by carbon is three times as efficient from the standpoint of carbon required as the indirect reduction, and says:

"The ordinary furnace produces at the tuyeres, in order to get heat enough to melt down the charges, more CO gas than is needed to abstract all the oxygen from the charges; under these conditions it is uneconomical to oxidize any carbon at all above the tuyeres. The exceptional furnace, because of pure ores, small amount of slag, pure fuel, high temperature of blast, or dry blast, gives heat enough at the tuyeres to melt down the charges without producing enough CO gas to reduce all the charges; under these conditions, more or less reduction is effected by solid carbon and with the greatest economy in quantity of carbon required in the furnace."

About two years ago H. P. Howland prepared an interesting paper, entitled "Calculations with Reference to the Use of Carbon in Modern American Blast

Furnaces," calling attention to the fact that many furnaces are actually operating with higher economy of coke than would be calculated from Grüner's theory; in fact, his calculations on the performance of 26 furnaces seem to show that what Richards regarded as the exceptional furnace is the rule rather than the exception in modern practice.

Howland's tabulation of data on these 26 furnaces is so interesting and pertinent to the subject that we are reproducing a portion of it in Table IV.

Note in the table the performance of the once-despised byproduct coke in modern practice. Of the 19 furnaces using less than a ton of coke per ton of pig iron, 13 are burning byproduct coke and 6 beehive coke. Howland calculates that all the furnaces burning less than 1350 lb. of carbon at the tuyeres are not making enough CO to reduce all the Fe₂O₃ and hence some of the latter must be reduced directly by carbon. He concludes:

"It seems clear, therefore, that in low-coke furnaces one of the most important, if not the most important function of the carbon burned at the tuyeres is to produce heat to enable the carrying on of the direct rather than to produce CO for indirect reduction.

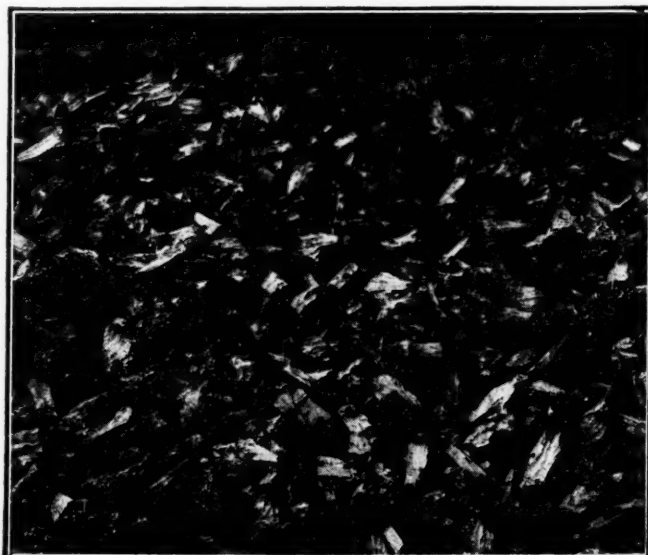


FIG. 14. COKE FROM HIGH VOLATILE COAL

*Presented by Mr. Ramsburg at a joint meeting of the Mechanical and Engineering Section and the American Society of Mechanical Engineers.

†Second vice president, the H. Koppers Co., Pittsburgh, Penn.

‡Chief chemist, the H. Koppers Co., Pittsburgh, Penn.

1"Metallurgical and Chemical Calculations," p. 248.

"On this basis, it becomes very essential that our carbon shall burn instantaneously to CO in order that the resulting heat may be localized where needed. This should not be a question of seconds, but of a fraction of a second. If our carbon is of such a nature that this burning to CO is a comparatively long process, more of it will be required than of the quick-burning carbon in order to obtain the same concentration of heat at the desired point.

"We would, therefore, say that the most desirable thing about a coke is that quality in the carbon which will allow of its being instantaneously burned to CO and thus result in the maximum concentration of heat where needed."

W. H. Blauvelt, in a discussion of Howland's paper, says: "In studying the combustion of coke in the furnace, it is clear that the production of the maximum quantity of heat is not of the first importance in blast-furnace operation, or in the utilization of the fuel charged into the furnace. To my mind, the production



FIG. 15. COKE FROM SAME COAL AS FIG. 14, WITH 20 PER CENT. POCAHONTAS

of a high thermal head at the tuyeres is of the first importance, and the best coke is that which reaches the tuyeres in proper condition to produce the highest

TABLE IV. RECORD OF AMERICAN BLAST FURNACES

Furnace No.	Pound Coke per Ton Iron	Tons Iron per Day	Carbon in Coke per Cent.	Kind of Method of Manufacture	Coke Operation	Total Charged	Gasi-fied in Furnace	Gasi-fied at Tuyeres	Per Cent. Total Carbon	Per Cent. Gasi-fied Carbon
1	2,615	301	86.3	BH	Stonega	2,254	2,110	1,868	82.8	88.6
2	2,551	272	84.4	BP	Solvay	2,153	2,049	1,751	81.4	85.6
3	2,472	482	86.1	BH	Conn.	2,128	1,996	1,728	81.2	86.6
4	2,247	450	87.1	BH	Conn.	1,957	1,846	1,605	82.0	87.0
5	2,198	499	86.9	BH	Conn.	1,908	1,810	1,494	78.7	82.6
6	2,123	541	88.3	BH	Conn.	1,875	1,764	1,498	79.8	84.9
7	2,115	360	84.3	BP	Solvay	1,782	1,683	1,427	80.1	84.8
8	1,996	490	86.3	BP	Koppers	1,722	1,611	1,298	75.4	80.6
9	1,936	376	85.7	BP	Solvay	1,659	1,557	1,305	78.8	83.7
10	1,905	393	88.7	BP	Solvay	1,690	1,575	1,252	74.1	79.5
11	1,901	517	85.5	BP	Koppers	1,625	1,524	1,280	78.8	84.1
12	1,863	504	86.6	BP	Koppers	1,614	1,513	1,230	76.2	81.3
13	1,780	426	84.9	BP	Koppers	1,511	1,414	1,124	74.4	79.5
14	1,742	503	84.6	BP	Koppers	1,474	1,382	1,133	76.9	82.0
15	1,716	542	87.1	BH	Benham	1,494	1,396	1,194	80.0	87.0
16	1,715	585	84.6	BP	Koppers	1,451	1,357	1,114	76.7	82.2
17	1,702	543	87.5	BP	Koppers	1,490	1,388	1,130	75.9	81.5
18	1,699	572	87.0	BP	Koppers	1,479	1,387	1,155	78.2	83.4
19	1,673	580	88.6	BH	Benham	1,482	1,384	1,182	79.9	85.0
20	1,658	590	88.3	BH	Benham	1,464	1,366	1,182	80.8	86.5
21	1,636	442	89.5	BP	Koppers	1,463	1,369	1,124	76.8	82.1
22	1,635	593	88.5	BH	Benham	1,447	1,349	1,124	77.7	83.4
23	1,624	592	87.3	BH	Benham	1,417	1,317	1,118	79.0	85.0
24	1,623	457	89.6	BP	Koppers	1,454	1,360	1,090	75.0	80.2
25	1,589	608	88.3	BH	Benham	1,403	1,307	1,100	78.5	84.2
26	1,584	466	89.2	BP	Koppers	1,413	1,324	1,057	74.8	79.9

NOTES.—BH = Beehive. BP = Byproduct. Conn. = Connellsville.



FIG. 16. 90 PER CENT. HIGH VOLATILE AND 10 PER CENT. POCAHONTAS COAL

temperature at the tuyeres, and in just sufficient quantity to do the amount of work required there under the conditions produced by this maximum temperature. The combustion of a much larger amount of fuel at the tuyeres, under conditions that will fall short of producing the highest possible temperature, cannot produce as good results, either in fuel economy or output. . . . Nothing is more fatal to obtaining the highest temperature than an excess of combustion. In the blast furnace an excess of air dilutes and cools the products of combustion, reducing the maximum thermal head at the tuyeres, and the larger volume carries the high temperature zone too high in the furnace. . . . It will probably be generally admitted that furnace coke should be of nearly uniform size, and many furnace managers are eliminating all coke below $\frac{3}{4}$ in. and above 4 or $4\frac{1}{2}$ in.; also, that the best coke is that which is sufficiently strong to resist undue abrasion and crumbling by attrition with the stock, and of an open porous structure that will permit the most rapid combustion when it reaches the tuyeres. Many large users agree that the coke should never

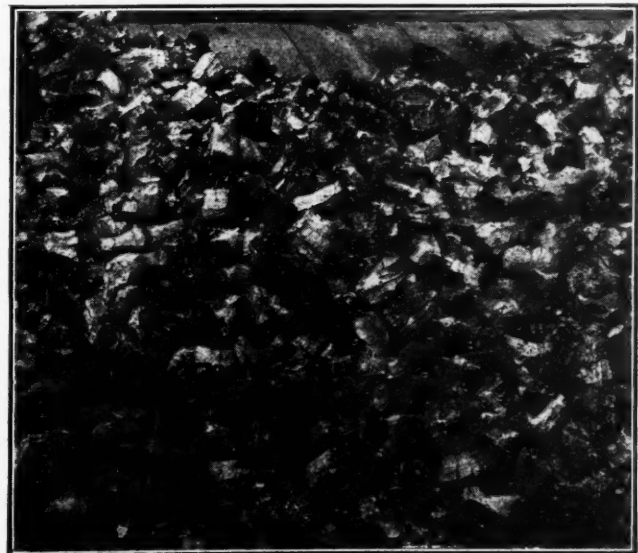


FIG. 17. 70 PER CENT. HIGH VOLATILE AND 30 PER CENT. POCAHONTAS



FIG. 18. COKE IMPROPERLY MADE

be overcoked beyond the point of producing a sufficiently strong structure, as overcoking quickly reduces the combustibility.

"If Grüner's ideal gives the best furnace operation, we should want a coke that is resistant to the oxygen in the ore, but easily combustible at the tuyeres, which is a contradiction of qualities. If my argument is correct, that the furnace man wants the greatest thermal head at the tuyeres rather than the production of the greatest quantity of heat in the furnace as a whole, then he is willing to sacrifice some coke by solution in the oxidizing gases in the upper part of the furnace, provided he can obtain a sufficient quantity of coke at the tuyeres, of a quality that will permit rapid combustion with the minimum amount of air, thereby giving him the maximum thermal head."

The desirability of the condition which Blauvelt aptly terms "a high thermal head" in the zone of the tuyeres will be readily granted even by those who adhere to Grüner's theory. This condition should be attained even at a sacrifice of some carbon by solution loss ($\text{CO}_2 + \text{C} = 2\text{CO}$), and we are of the opinion that the importance of this solution loss is frequently overestimated. Most laboratory experiments made to determine the loss undergone by different cokes have been of little value, because they have been mostly made with pulverized samples, so that their original physical condition has been greatly altered.

We have lately tested the resistance of a number of cokes to the action of CO_2 at temperatures of 800 and 900 deg. C., and find the loss of coke pulverized to 40 mesh to be very much greater than the same coke prepared in small test pieces, $\frac{3}{4} \times \frac{3}{4} \times 1\frac{1}{2}$ in., so as to retain the original structure.

As furnace conditions are better understood the possibility of the use of coke of a wider instead of a more restricted range of quality will become better recognized, with the express limitation that the supply for each furnace must always be absolutely uniform in quality. This requirement of uniformity cannot be too strongly emphasized, and it is almost equally necessary for the proper operation of the coke plant as the blast furnace; but this does not mean that there is one standard grade of coke to which all plants should

conform so far as possible. As a matter of fact, the range of cokes that successfully qualify in practical operation is continually being extended, through necessity of one sort or another, with little general realization of the fact. In illustrations accompanying the preceding installment of this article have already been shown the cell structure of some cokes that are giving good results in different American blast furnaces, and the difference is fairly remarkable.

However, for each kind of coke there is evidently some limiting size for efficient service—that is, just large enough to offer such a minimum surface of attack for CO_2 that the loss on this account is negligible, and small enough so that complete combustion may be effected in a minimum of time at the tuyeres. Hardness of body is usually—though possibly not necessarily—proportional to the resistance of a given coke to oxidation by CO_2 or oxygen. The harder grades of coke should be used in smaller sizes—and this is a compensation automatically provided to some extent by the operation of the byproduct oven. Similarly, cokes of close cell structure are more resistant to oxidation, but this may be offset to a large extent by softness. The coke of more open cell structure will probably require less rigid attention to sizing than the denser coke. The important thing is to determine the practical limits of these elements of size, hardness and cell structure. It may be found that a coke of such structure as No. 4 of our scale may be unsuitable, no matter what may be its size or softness; but this ought to be proved by actual test and not taken for granted.

These considerations are of the utmost importance and encouragement to the coke-oven man, because, with a reasonable choice of coal, his control over the quality of his coke is almost unlimited, and, even with a very restricted source of supply, the possibilities of conforming to the desired standard by proper oven construction and regulation are still remarkably great. We propose to conclude this paper by showing two or three examples of what can be accomplished in the way of control of this sort.

One proposition that frequently presents itself is that of eliminating sponge. Sponge is a characteristic honeycombed mass formed in the center of rich volatile



FIG. 19. COKE SHOWING ELIMINATION OF SPONGE

matter. It seems to be caused by an excess of pitchy material moving along with the fused zone in the coking process, and finally accumulating in the center of the oven, where it is eventually gasified, with the production of this light porous material. Sometimes this sponge is found in loose, detached masses scattered all over the coke as it lies on the wharf after quenching, or, again, it may be found adhering very closely to the ends of the pieces of coke, and sometimes blend-

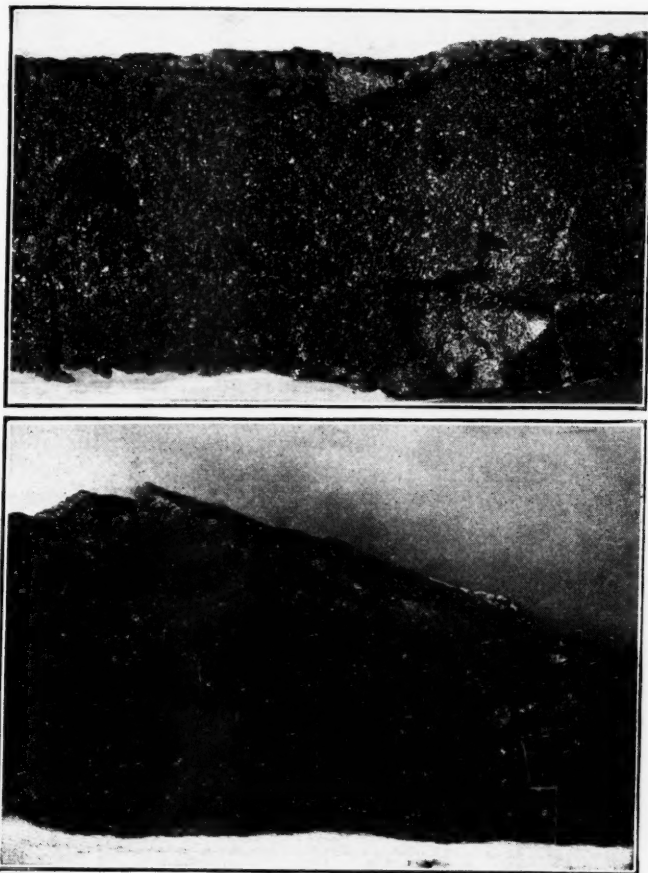


FIG. 20. COKE FROM SAME COAL—DIFFERENT OVENS

ing, without any clear line of demarcation, into the body of the coke itself.

Although the amount of this sponge often appears to be very large, it is so bulky that its actual percentage by weight is small. In one case where the amount of sponge seemed to be very large it was actually found that it amounted to 1.65 per cent. of the total coke. Small amounts of sponge probably do no harm, most of the material being soon broken up in the operations of handling the coke, but the presence of the material undoubtedly occasions a certain loss of carbon, and so we usually try to get rid of it. The customary remedy—and one that always works—is to mix with the high volatile coal sufficient low volatile coal, which has the effect of absorbing the excess of bituminous material and eliminating the conditions of sponge formation. Pocahontas coal is the standard low volatile coal that is employed by many of our plants. It is to be noted that different coals require considerably different percentages of Pocahontas coal to completely eliminate the sponge. Fig. 14 shows a coke from unmixed high volatile coal (about 34 per cent. volatile matter). A large amount of sponge is

readily apparent. Fig. 15 shows the coke from a mixture containing 80 per cent. of this same coal with 20 per cent. of Pocahontas. The sponge is entirely eliminated and the structure of the coke improved. Fig. 16 shows coke made from a mixture of 90 per cent. of another coal, containing approximately the same percentage of volatile matter, with 10 per cent. of Pocahontas. This shows a fairly large amount of sponge. A mixture of 70 per cent. of this coal with 30 per cent. of Pocahontas still produces some sponge (Fig. 17), and it required as much as 40 per cent. Pocahontas to eliminate the sponge entirely.

Frequently it is too expensive a proposition to buy low volatile coal for the sake of eliminating a little sponge, and sometimes the low volatile coal may be altogether inaccessible for practical purposes. This does not, however, leave us at the end of our resources. By proper methods of control sponge may be eliminated from a wide variety of coals that produce it under ordinary conditions. If the oven is correctly designed and proportioned, and the temperature and coking time carefully regulated, very satisfactory results may be obtained without the necessity of making a special coal mixture. Fig. 18 shows the coke from one coal which was made in a type of oven unsuited to it, and coked at unfavorable temperatures. Fig. 19 shows coke made from the same coal under proper conditions. The sponge has been entirely eliminated.

Occasionally one of the most difficult problems to be overcome is that of too great density of cell structure. Here, again, we can approach the problem in two ways: One, by mixing in one or more other coals that have a tendency to the production of a more open cell structure, and the other way by suitable preliminary preparation of the coal, careful heat control, and special design of the oven. Fig. 20 shows coke made from the same coal mixture coked at different plants under different conditions. The dense coke shown in the lower part of the figure was greatly improved upon when the nature of the coal was better understood, and the excellent product shown in the upper part of the figure was then made when the coal was treated in the right kind of ovens and under proper conditions.

To insure the best results, a special study must be made of each kind of coal that it is proposed to use, and it would be well, in all cases where a new plant is contemplated, to make this study previous to a design of the plant, because the results may suggest some necessary changes in design that would not otherwise be foreseen.

Production of Fuel Briquets

The output of fuel briquets in the United States in 1917 was 406,856 net tons, valued at \$2,233,888, an increase over 1916 of 111,701 tons, or 38 per cent., in quantity, and of \$788,226, or 55 per cent., in value, again breaking the record of the previous year. According to C. E. Leshner, of the United States Geological Survey, Department of the Interior, the demand for fuel in 1917 was so strong throughout the whole year that there was no lack of market to limit the production of the briquet manufacturers. Despite the increased cost of binders and of manufacturing, most of the plants profitably operated to full capacity.

Cost Accounting at Coal Mines

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SYNOPSIS—*Just as a clinical thermometer reveals a healthy or unhealthy condition in a physician's patient, so a judicious cost-accounting system at a coal mine reveals a healthy or an unhealthy business condition. More than this, properly itemized costs reveal not only if trouble exists but the exact location thereof. A study of the costs of going operations would doubtless save many proposed firms from embarking on a career that is at best financially precarious.*

THE cost statement of a coal-mining operation has two main functions. Its primary object is, of course, to show the total average expense of producing a ton of coal over a given period. Secondly, it should show the cost per ton of each phase of the operation of production—digging and loading in the mine, hauling, handling at the tippie, etc.—and also the allied expenses less directly connected with the physical act of producing the tonnage, such as superintendence, office expenses, royalty, depreciation and others of a like nature.

A properly prepared cost statement is to the mine operator what the clinical thermometer is to the physician. As a rise above normal in the latter instrument indicates an unhealthy condition of the patient, so an increase in the per-ton total on the cost statement above the figure at which coal should ordinarily be produced at the mine in question, shows an abnormal and perhaps unhealthy condition of the mining enterprise.

But even more efficient than the doctor's thermometer is an accurate and complete tabulation of operating costs, for it not only gives notice of unusual conditions in the mine or office but, when properly itemized, it enables the management to locate quite closely the seat of the trouble.

COST SYSTEM NEGLECTED BY MANY OPERATORS

In view of the vital importance of cost accounting to any complicated industrial enterprise, it is surprising how many smaller coal operators keep no accurate record of their production costs, being content with little more than a guess as to what their actual expenses of mining are and giving never a thought to the less apparent items of maintenance of buildings, depreciation of plant and equipment, depletion of coal area, compensation for their own services, and interest on invested capital.

In only too many instances a true and complete cost statement would show that the operation is being conducted at an actual loss and that the average price obtained for the coal has not been sufficient to cover the total cost of production. This may be true even without any serious blunders in management, due merely to the fact that, owing to physical and economic conditions, the coal can not be produced at these particular mines as cheaply as at others affording a similar grade

of fuel whose output is sufficient to supply the normal market.

Probably many an operator of this class has gone into the mining business on the comfortable theory that because a nearby mine has been running for a few years and presumably making money, therefore his operation will do the same; and he proceeds cheerfully on his way, satisfied with the fact that he is selling his coal for perhaps 25c. a ton above the cost of labor and supplies. His rude awakening comes when, after a few years of operation, he needs to buy more mine cars, a new locomotive, enlarge his power plant, repair the tippie or drive a pair of headings through an extensive rock roll. He finds that not only has what he calls "mining costs" increased with the extension of the workings, but he is faced with a large expenditure for additions and renewal to meet which no fund has been created.

Should he decide to sell his property and conserve "profits" already secured, he finds that his depleted coal acreage and deteriorated mine plant will return nowhere near the capital invested in it. At this late date the significance of a complete and well considered form of cost accounting will be only too apparent.

Though the evil effects of such a business method are confined mainly to the injudicious operator himself and to those who have invested with him in the enterprise, yet when cases similar to the one cited are multiplied many times, as they have been in the bituminous coal fields of this country, they adversely affect the whole industry.

LACK OF SYSTEM AFFECTS ENTIRE INDUSTRY

Such operators, with their false ideas of costs, will, in a dull market, often sell their output at an actual loss, thus lowering prices and unduly reducing the margin of profit to those who are conducting their business on an economically sound basis.

It is a well known fact that the majority of mines in some of our largest bituminous coal districts have been run for years on an unjustly small margin of profit, if not at an actual loss, their owners holding fast as best they might, stinting repairs and improvements and gradually depleting their coal reserves without adequate returns on their investment, waiting for the occasional appearance of abnormal conditions, such as an anthracite strike, a great industrial boom or a world war, to enable them to realize a compensating profit.

Unquestionably this situation has arisen largely from the competition of operators who, being unfamiliar with comparative mining costs, have undertaken to develop properties not economically ripe for mining (because of location, character of seam, quality of coal, etc.). Once being committed to the enterprise, they carry it through to the bitter end by selling their product at or below cost. In some instances they do so knowingly. Having their capital invested, they hope for a turn in the market which will let them out with a minimum of loss. In other cases, however, the low price is due to the lack of a proper accounting system to reveal the true state of affairs. Of course this condition is not peculiar to the

coal-mining business. Former Chairman Hurley of the Federal Trade Commission recently said:

A preliminary study of industry generally, as made by the Federal Trade Commission, revealed the fact that not more than 10 per cent. of manufacturers know what it costs to produce their goods, and that the remaining 90 per cent. are pricing their goods arbitrarily, either by guess-work or fixing their prices to conform with, or to beat, the prices made, or supposed to be made, by their equally ignorant competitors—and further, that only a very small percentage of manufacturers make any charge for depreciation of plant and equipment—and that therefore their products are priced before reckoning this important and vital item. To this is due the great demoralization in many lines of industry and the high business death rate.

Fortunately these regrettable conditions are rapidly becoming widely recognized, and much is being written on the subject of cost accounting in the technical press of the day.¹

In the field of coal mining special impetus has been given to the movement toward full and complete accounting by the recent action of the Federal Trade Commission in requiring all coal and lignite operators to submit monthly statements of cost, income and tonnage on specially prepared forms. Four separate forms are prescribed and furnished by the Commission: C-1, for semi-bituminous, bituminous or sub-bituminous coal, or lignite operators producing more than 100,000 net tons per annum; C-2, for such operators producing less than 100,000 and more than 12,000 net tons per annum; C-3, for such operators producing less than 12,000 tons per annum, and C-4, for anthracite and semi-anthracite operators.

ACCEPTABLE STATEMENT FORM BEING DEVELOPED

These forms vary in complexity according to the size of the operation reporting, but those for mines producing over 12,000 tons a year require quite a complete statement of expenditures, charges and income, and necessitate a fairly comprehensive accounting system on the part of the reporting operator.

Another recent important move in the direction of better methods of accounting was that of the National Coal Association in appointing a committee to draft a standard form of "Statement of Coal Production Cost and Revenue" and to prepare a "Manual of Cost Distribution." This was to be done in cooperation with representatives of the Federal Trade Commission. Some delay has been occasioned by the failure of two groups of experts to agree on certain items in the schedules considered, but it is to be hoped that a mutually acceptable form of statement will soon be determined upon and submitted to the operators of the country.

Numerous systems of cost accounting are in use at the many mining operations in our extensive coal fields, some elaborate, with a dozen or more headings and scores of minor sub-divisions, others recording little more than inside and outside labor, supplies and general expenses.

While it is not the purpose of this article to recommend any special method of accounting, the "Statement of Coal Costs" reproduced on this page embodies the

principal items which a proper cost system should show. It is essentially a form used by a large and well managed mining company of western Pennsylvania, somewhat altered and enlarged to include certain advantageous features in use by accountants of other companies whose records have been examined.

The method of distributing expenses shown in the table may advantageously be altered in detail to suit varying conditions at different operations. Certain items

STATEMENT OF COAL COSTS

Mining:	Labor Amt. Cents per Ton	Material Amt. Cents per Ton	Total Amt. Cents per Ton
Pick coal.....			
Machine coal (cutting and loading).....			
Total and average.....			
Maintenance of mining machines.....			
Mine props and caps.....			
Powder for shooting coal.....			
Total.....			
Maintenance of Development:			
Yardage or narrow work.....			
Slate removal.....			
Rockwork.....			
Timbering.....			
Total.....			
Transportation:			
Operation of animal haulage.....			
Operation of mechanical haulage.....			
Maintenance of roads, planes, etc.....			
Maintenance of live stock and stables.....			
Maintenance of mine cars.....			
Total.....			
Ventilation:			
Bratticing, overcasts, etc.....			
Operation of fan.....			
Trappers.....			
Total.....			
Drainage:			
Pumpers.....			
Maintenance of pumps and pipes.....			
Ditching.....			
Bailing water.....			
Total.....			
Power:			
Operation of power plant.....			
Maintenance of power plant.....			
Maintenance of power lines.....			
Fuel.....			
Total.....			
Preparation and Loading:			
Weighing and dumping.....			
Coal cleaners.....			
Car trimmers and droppers.....			
Maintenance of tipples and scales.....			
Total.....			
General Mine Expenses:			
Superintendence.....			
Foremen and firebosses.....			
Watchmen.....			
Office.....			
Handling supplies.....			
Engineering.....			
Maintenance of buildings.....			
Total.....			
Gross Regular Mine Expenses.....			
Overhead Expenses:			
Royalty.....			
Administration.....			
Taxes.....			
Insurance.....			
Selling.....			
Depreciation of plant.....			
Depletion of coal.....			
Extraordinary expenses.....			
Total.....			
Gross expenses of operation.....			

may be wholly eliminated—for instance, most of those under power if electric current is purchased—or others may be subdivided to record certain charges in greater detail. Of course if washing, coking or stripping operations are carried on separate accounts must be opened for them.

But whatever the details of the accounting system adopted, the records should be in such form that the expenses of operation can be periodically tabulated in a

¹Of particular interest to coal operators is a paper read before the National Coal Association at Pittsburgh, Oct. 23, 1917, by J. B. L. Hornberger, comptroller of the Pittsburgh Coal Co.; also an address by this gentleman before the American Mining Congress, October, 1913, printed in "Coal Age" of Nov. 1, 1913. An instructive paper by R. J. Maxwell on "An Accounting System for Coal Mines," was reprinted from the Canadian Mining Institute Bulletin in "Coal Age" of Jan. 20 and Feb. 3, 1917.

manner similar to the one outlined here so that the costs of the major operations connected with mining can be seen at a glance.

With a set of such tables before him the operator not only knows what the total cost of his product was during each period, but by comparison he can quickly locate the division in which an excessive expense has been incurred and promptly investigate the cause.

In conclusion, let it be noted that a proper system of mine cost accounting not only reveals the cost of the mine output and thus enables those interested to determine the financial status of a going operation, but it is of great value in forecasting the probable cost of coal from a new development of a similar character to the one whose costs are known.

If a prospective investor or operator has a proper tabulation of actual costs obtaining at one or more going mines, he can, by a study of physical conditions on a new property and the wage scale likely to apply there, make a fairly close estimate of what operating costs at the proposed mine will be.

Had such data and methods of analysis been utilized more generally in the past, there would be fewer coal-mining ventures doomed to failure through the physical impossibility of producing coal under the given conditions at a cost sufficiently below its normal selling price to net the operator a profit.

Coal Riches in Southern Algeria*

Recently, in the course of training members of the "Foreign Legion" in modern military tactics in southern Algeria, trench diggers struck a rich bed of anthracite coal. The discovery has aroused a great deal of interest in France and Italy, where the coal question is in a most acute stage.

Geologists now recollect that in 1908 G. B. M. Flament, a scientist specializing on Algerian formations, called the attention of French geologists to the peculiar characteristics of the geological strata in southern Algiers, which were almost identical with those of the Westphalian coal district in western Germany. He suggested that borings be made at different points to determine the presence or absence of coal beds. He even ventured to roughly estimate the area of the coal field as covering 54 x 93 miles. The prospecting was never carried out and France lost an opportunity to be self-supporting in its coal requirements.

Since the accidental discovery of the coal under the training field, several railroads have continued the prospecting and have found in many places, at a depth of only 10 ft., beds of excellent coal varying in thickness between 50 and 80 cm. (20 to 32 in.). Engineers have estimated the deposits within a square kilometer at not less than 30,000 tons, which could easily be handled by the military railway now leading from the training camp to the coast (the Colomb-Bechar road). As coal sells for 150 fr. (about \$30) a ton in Algiers, and 350 fr. (about \$70) further inland, the find represents a huge fortune, especially as the first 30,000 tons could shortly be followed by many other thousands.

It is not too much to say that had France put down the borings suggested in 1908 it would not be in so critical a position today, in regard to fuel for its factories.

*Translated from "Le Courier Colonial."

Who's Who In Coal Mining

Frank J. Hayes, the Union's President

By K. C. ADAMS

Just as frank as his name, Frank J. Hayes, president of the United Mine Workers of America, in six months has proved by his steadiness that he is in every way capable of leading the destinies of the world's largest trade union.

Seven years' experience in labor-union work as vice president of the International, and as many more years as secretary-treasurer of the Illinois District organization, abundantly furnished the new miners' chief



FRANK J. HAYES

Born at Whatcheer, Iowa, May 4, 1882, his first office in the miners' union was that of secretary of his local at Breese, Ill. He served as sub-district and district secretary of Illinois miners continuously from 1903 until his elevation to the vice presidency of the International in 1910.

with the equipment he needed to succeed John P. White, whose labors he assumed last October.

When Hayes was elected to the vice presidency he found the job anything but pleasant, for T. L. Lewis, who was then president, was at outs with the mine workers of the Illinois district, from which organization Hayes hailed. Lewis was attempting to force the Illinois men to accept a compromise settlement with their operators. The district organization refused and Hayes stood by the district. Lewis denied Hayes an office at headquarters and point blank refused to supply him with a stenographer. Lewis also withheld from Hayes certain important assignments, which precedent prescribed should be turned over to the vice president's office as part of his established authority in directing the field work of the union organizers. But Hayes stuck to the job. While loitering around headquarters awaiting the president's pleasure during 1910 he pried deep into the affairs of the organization. Where he found abuses and inefficiency he looked for a remedy and obtained facts that served him well in later years.

The fight between the Illinois miners and Lewis continued. Special conventions and board meetings were held almost continuously, and in each succeeding session the battle between Hayes and Lewis grew in bitterness. The Illinois miners finally won, and Lewis' policies were repudiated. Friends of Hayes urged that he aspire for the presidency, but Hayes along with others had urged John P. White, president of the Iowa miners, to oppose Lewis. For this reason Hayes refused to stand for the office. He would have offered himself had he not already declared himself a supporter of Mr. White. He reasoned that he was a young man with time aplenty ahead in which to reach the goal of his life's ambition. The decision of Hayes established for him the reputation of being a leader with strong common sense.

White defeated Lewis overwhelmingly and Hayes welcomed the new leader into office with all the good will and coöperation of his heart. Teamwork so often referred to as essential to progress and so seldom practiced, became a reality. Dual movements organized against the Lewis régime were quickly routed. Successful wage agreements were negotiated for both bituminous and anthracite miners. White and Hayes were pulling the rope at the same time. And during the six years they served together never a single jerk failed to find them pulling with a united effort.

Many times ill-advised friends importuned Hayes to run against White. The politically ambitious of the union ranks repeatedly sought to cause a rupture in the hope of profiting thereby. But always Hayes exercised his strong common sense. As has been well said: "His ability to uncover their true purposes when political schemers advanced fictitious arguments and the readiness with which he rejected all proposals which were linked with hypocrisy caused those designing persons keen disappointment."

And as he has moved on through the years of official life he has cultivated that rare common sense that frankly admits errors, a trait rare among those in political life and one which is unfortunately only briefly retained by those who happen to possess it when they enter that career, with its many pitfalls. His directness and simplicity enables him to be a patient listener and yet to say No when the occasion so demands.

Let me give a few examples of how Hayes has given decisions with telling results: For many years it has been recognized that the per capita tax of the International Union was not sufficient to finance the organization on a basis of assured progress.

Talk per capita increase to the average member and right away you are on the defensive. To the 1918 convention Hayes not only recommended an increase, but urged that the tax be doubled. Immediately there was an organized move to reduce the increase proposed, in part if not in its entirety. Hayes gave the convention two votes on the question and common sense carried the day with a whoop.

During the discussion Mother Jones sought to have Hayes recognize one of her "pet boys" from somewhere in the jurisdiction. Hayes quietly imparted to the "Angel of the Camps" that she was all right, that the boys were all for her and appreciated her efforts, but that on important deliberative questions the Chair had

the right to say who was entitled to the floor. There wasn't any camouflage about the incident. Hayes simply stated he was president; the convention accepted his decision with applause and continued business in an orderly way.

The United Mine Workers Journal has been a football in organization politics since it was established in 1891. Great financial losses have resulted from the voluntary subscription plan by which it has been conducted and by the restrictions which have been placed on advertising. All other International unions of consequence have long ago put into effect a per capita subscription. Changes of one kind or another have been suggested at every Board meeting of the International. At the recent meeting of the board Hayes, acting upon the recommendation of a committee in which John L. Lewis, his vice president, was a leading member recommended and put through unanimously a program whereby the official organ will be published semi-monthly and will go free to each of the 400,000 members—an educational move that should have been adopted long ago. With each member receiving the Journal, a copy of every official document published therein, there will be no excuse for any individual remaining in ignorance of the organization's problems and progress.

On Apr. 13 the International Executive Board unanimously approved a telegram offered by Hayes protesting against the inefficiency of the Fuel Administration. The message did not follow the stereotyped lines of resolutions, but pointed out plainly the whys and wherefores of the Fuel Administration's failure, and plainly stated what must be done to solve the fuel problem. Nothing in the telegram savored of selfishness or pettiness. The next day Hayes and his associates wired President Wilson protesting against the attempt made by the Director of Railroads to make good at the expense of the coal industry by hammering down the price of coal. This is another demonstration of Hayes' plain common sense.

In six months Hayes has negotiated a successful anthracite wage agreement. He has raised \$800,000 security to appeal the verdict of the Coronado Coal Co. and others against the union. He made all preparations to fight the case of the Hitchman Coal and Coke Co., a decision having been rendered which would prohibit union organization activities from being carried to a successful conclusion. He has established a union legislative committee at Washington to assist labor from being victimized in hurried war-time legislation and he has forced the issue with the Federal Fuel Administration, in such a manner that solid organization of Alabama mine workers is insured.

During his administration the union has purchased over \$400,000 worth of Liberty Bonds to finance worldwide democracy. Hayes has served as a member of Uncle Sam's war labor board by which a policy between capital and labor during the continuance of the war has been formulated and accepted. He has reorganized the field forces of the organization and defeated the would-be secessionists of Colorado led by the ungrateful John Lawson. He has convinced the public that he is a man possessed of common sense, a man whose slogan is "sanity first." Watch Hayes, for he is one of the big men of labor and is sure to make a wonderful record.

Zone System for the Distribution of Bituminous Coal

By order of the Fuel Administration the distribution of bituminous coal for the year beginning Apr. 1, 1918, will be controlled by a zone system, which is intended to reduce the burden on the railroads, facilitate shipment of coal, and keep all the mines working at full capacity.

THE factor that loomed largest in the fuel crisis of last winter was the lack of adequate transportation facilities. Under the plan of distribution then followed, a consumer in any part of the country was free to order his coal supply from any producing district, regardless of the length of haul involved. As a consequence, it often happened that cars and locomotives were engaged in delivering coal to distant regions that could have been served far more quickly from fields near by.

Obviously, this complete freedom of choice as to the source of coal used led to cross-hauling in addition to the utilization of railroad equipment in unnecessarily long hauls, the result being a great waste of transportation power. To prevent this needless waste and make possible an increased production to meet the war demands, the United States Fuel Administration, in conjunction with the Director General of Railroads, has announced a zone system for the control of bituminous-coal distribution for the year beginning Apr. 1, 1918.

The zone system was adopted only after prolonged conferences with coal producers, jobbers and consumers, as well as with the traffic and operating officials of the railroads. Briefly explained, it divides the country into a number of zones, each of which must obtain its coal supply from mines that are relatively near, thus preventing abnormal and wasteful transportation movements, insuring more nearly equal distribution of cars to the mines and more steady employment of mine labor.

Of course, so radical a change in the methods of conducting the coal business will cause some inconvenience to producers and consumers, and will involve additional expense in some cases. For example, the producers of Pocahontas coal may no longer ship their output to Chicago and Western points by rail; as a result, they must find new markets in the East. Those plants in and around Chicago that have been burning West Virginia coal will be compelled to substitute Illinois coal, which can be obtained with less than half as long a haul.

It is the hope of the Fuel Administration, however, that the consumer and the producer will bear these unavoidable inconveniences in the realization that the readjustment of the distribution of coal is for the welfare of the nation. In other words, they are appealed to on the grounds of patriotism.

There are exceptions to the conditions imposed by the zone system. Certain industries require coals of particular quality or characteristics, as, for example, by-product, gas, blacksmith and metallurgical coals. If a consumer needs coal of one of these kinds and is unable to obtain it from the producing districts that are permitted to ship into the zone in which he is located, permits will be issued to allow the special-purpose fuel to be brought in from other districts.

The zone system does not affect the following bituminous coal:

1. Coal for railroad fuel, for which special arrangements will be made by the Fuel Administrator and the Director General of Railroads.

2. Coal for movement on inland waterways, which is in no way restricted by the system.

3. Coal delivered to Canada, which is subject to regulations of the Fuel Administrator.

To enable the consumer of bituminous coal to determine the districts from which he may obtain his fuel and to show the producer the zones in which he may sell his output, the map inserted as a supplement to this issue of *Coal Age* has been prepared.

It will be seen that the entire territory of the United States has been divided into a large number of irregular zones or sections, colored differently so that they may readily be distinguished one from another, and each marked with a key number. Each of these separately numbered zones has certain definite boundary lines and is restricted to the use of coals from certain districts. The Key to Consuming Zones gives a complete list of all the zones shown on the map, states the districts from which they may obtain coal, and defines the boundaries of each zone.

If a consumer wishes to find out what coals are available for his use, he locates on the map the zone in which he lives and notes its number. Then, in the Key to Consuming Zones, under that zone number, he will find the list of producing districts from which he can obtain coal. In case there is any doubt as to the number of the zone in which he lives, reference to the boundaries given in the key will at once decide the point. Following this key is a list of the meanings of the abbreviations and terms used in the key.

The Key to Producing Districts is intended to show the producer the several zones in which he may market his product. He knows the district in which his mine is located, and on referring to this key he finds the numbers of the zones, as shown on the map, into which the output from his mine may be sent.

A wall map of large size, showing the same zoning in fuller detail, may be obtained from the Coal Zone Map Co., Glen Echo, Maryland.

Key to Consuming Districts

ZONE NO. 1

RESTRICTED TO FOLLOWING COALS
—North Dakota, South Dakota, docks.

BOUNDARIES—Northern and Western:
Lake Superior and Canada; North Dakota state line and South Dakota state line to

Ortonville, Minn. **Southern and Eastern:**
From Ortonville via C. M. & St. P. Ry. through Granite Falls and Benton Junction to Minneapolis, thence via M. St. P. & S. S. M. Ry. through Chippewa Falls and Abbotsford to Amherst Junction, thence via G. B. & W. R. R. to Kewaunee, Wis.;

western banks of Lakes Michigan and Huron.

ZONE NO. 2

RESTRICTED TO FOLLOWING COALS

—Illinois (summer only), docks, North Dakota, South Dakota, Iowa (to points in Iowa only).

BOUNDARIES—Northern: From Kewaunee, Wis., via G. B. & W. R. R. to Amherst Junction, thence via M. St. P. & S. S. M. Ry. through Abbottsford and Chippewa Falls, Wis., to Minneapolis, Minn., thence via C. M. & St. P. Ry. through Benton Junction and Ortonville, Minn., to the Minnesota-South Dakota state line. **Western:** Minnesota-South Dakota state line. **Southern:** Commencing at South Dakota-Minnesota-Iowa state line east to the C. R. I. & P. Ry. line running through Gordonsville, Minn., and Northwood, Iowa, thence south via that line to Mason City, Iowa, thence east via C. M. & St. P. Ry. through McGregor, Iowa, Madison and Watertown to Milwaukee, Wis. **Eastern:** Lake Michigan from Kewaunee to Milwaukee, Wis.

ZONE NO. 3

RESTRICTED TO FOLLOWING COALS—Illinois, Kentucky (Western), Indiana, docks.

BOUNDARIES—Northern and Western: From Milwaukee, Wis., via C. M. & St. P. Ry. to Waukesha, thence via M. St. P. & S. S. M. Ry. to Illinois-Wisconsin state line. **Eastern and Southern:** From Milwaukee, Wis., via Lake Michigan (west bank) to Illinois-Wisconsin state line, thence via that line to M. St. P. & S. S. M. Ry.

ZONE NO. 4

RESTRICTED TO FOLLOWING COALS—Illinois, Kentucky (Western), docks.

BOUNDARIES—Northern: Via C. M. & St. P. Ry. from Milwaukee, Wis., through Watertown to Madison, Wis. **Southern:** Via C. M. & St. P. Ry. from Milwaukee, Wis., through Milton Junction to Madison, Wis.

ZONE NO. 4A

RESTRICTED TO FOLLOWING COALS—Illinois, docks.

BOUNDARIES—Northern and Western: From Milwaukee, Wis., via C. M. & St. P. Ry. through Milton Junction to Madison, Wis., thence via I. C. R. R. to Dixon, Ill. **Eastern and Southern:** From Milwaukee, Wis., via C. M. & St. P. Ry. through Elkhorn to Beloit, Wis., thence via C. & N. W. Ry. through Belvidere and Sycamore to Dixon, Ill.

ZONE NO. 5

RESTRICTED TO FOLLOWING COALS—Iowa, Kansas, Illinois, Missouri Oklahoma, Arkansas.

BOUNDARIES—Northern and Eastern: From Sioux City, Iowa, via C. M. & St. P. Ry. through Rock Valley and Spencer to Nora Junction, thence via C. R. I. & P. Ry. to Cedar Rapids, thence via C. M. & St. P. Ry. through Sigourney to Ottumwa, thence via C. R. I. & P. Ry. to Keokuk, Iowa, thence via Mississippi River to Missouri-Arkansas state line. **Western and Southern:** From Sioux City, Iowa, via C. M. & St. P. Ry. through Manilla and Adel to Des Moines, Iowa, thence via C. B. & Q. R. R. to Albia, thence via W. Ry. to Moravia, Iowa, thence via C. M. & St. P. Ry. to Chillicothe, Mo., thence via W. Ry. to Moberly, thence via M. K. & T. Ry. through New Franklin to North Jefferson City, thence via western boundary of Cole, Miller and Pulaski Counties to St. L. S. F. Ry., thence via St. L. S. F. Ry. through Springfield and Neosho to Missouri-Oklahoma state line, thence south to Arkansas-Missouri-Oklahoma state line, thence east via Arkansas-Missouri state line to the Mississippi River.

ZONE NO. 6

RESTRICTED TO FOLLOWING COALS—Illinois, Kentucky (Western).

BOUNDARIES—Northern and Western: From Arthur, Ill., via P. C. C. & St. L. R. R. to Decatur, Ill., thence via I. C. R. R. through Centralia to Cairo, Ill., thence via Mississippi River to Memphis, Tenn. **Eastern and Southern:** From Arthur, Ill., via C. & E. I. R. R. through Marion to Joppa, Ill., thence via I. C. R. R. through Clinton and Fulton, Ky., and Dyersburg, Tenn., to Memphis, Tenn.

ZONE NO. 6A

RESTRICTED TO FOLLOWING COALS—Illinois, Kentucky (Western), docks.

BOUNDARIES—Northern: From Madison, Wis., to Woodman, Wis., via C. M. & St. P. Ry. **Southern:** From Madison, Wis., to Woodman, Wis., via C. & N. W. Ry.

ZONE NO. 7

RESTRICTED TO FOLLOWING COALS—Illinois, Iowa (to points in Iowa only).

BOUNDARIES—Northern and Eastern: From Nora Junction, Iowa, via C. M. & St. P. Ry. to Woodman, Wis., thence via C. & N. W. Ry. to Madison, Wis., thence via I. C. R. R. to Freeport, Ill., thence via I. C. R. R. to Dixon, Ill., thence via C. & N. W. Ry. through Nelson to Peoria, thence via P. C. C. & St. L. R. R. to Decatur,

thence via I. C. R. R. through Centralia to Cairo, Ill. **Southwestern:** From Nora Junction, Iowa, via C. R. I. & P. Ry. to Cedar Rapids, thence via C. M. & St. P. Ry. to Ottumwa, thence via C. R. I. & P. Ry. to Keokuk, Iowa, thence east of the Mississippi River to Cairo, Ill.

ZONE NO. 8

RESTRICTED TO FOLLOWING COALS—Illinois, Indiana.

BOUNDARIES—Northern and Eastern: From Dixon, Ill., via I. C. R. R. to Decatur, Ill. **Western and Southern:** From Dixon, Ill., via C. & N. W. Ry. through Nelson to Peoria, Ill., thence via P. C. C. & St. L. R. R. to Decatur, Ill.

ZONE NO. 9

RESTRICTED TO FOLLOWING COALS—Illinois, Indiana, Kentucky (Western).

BOUNDARIES—Northern and Western: From Waukesha, Wis., via C. M. & St. P. Ry. to Beloit, Wis., thence via C. & N. W. Ry. through Belvidere, Sycamore, DeKalb, to Dixon, Ill., thence via I. C. R. R. to Decatur, Ill., thence via P. C. C. & St. L. R. R. to Arthur, thence via C. & E. I. R. R. through Mt. Vernon to Joppa, Ill. **Eastern and Southern:** From Waukesha, Wis., via M. St. P. & S. S. M. Ry. to Wisconsin-Illinois state line, thence via this line to Lake Michigan, thence via Lake Michigan to Michigan City, Ind., thence via C. I. & L. Ry. to San Pierre, thence via N. Y. C. R. R. to Wheatfield, thence via C. & E. I. R. R. through Brazil and Otter Creek Junction through Vincennes to Evansville, Ind., thence both sides of the Ohio River, Evansville, Ind., to Joppa, Ill.

ZONE NO. 10

RESTRICTED TO FOLLOWING COALS—Indiana, Illinois (Danville district on Wabash Ry. only), Kentucky (Western, to Jeffersonville and New Albany only).

BOUNDARIES—Northern and Western: From San Pierre, Ind., via N. Y. C. R. R. to Wheatfield, thence via C. & E. I. R. R. through Brazil, Otter Creek Junction and Vincennes to Evansville, Ind. **Eastern and Southern:** From San Pierre, Ind., via C. I. & L. Ry. to New Albany, Ind., thence along northern bank of Ohio River to Evansville, Ind.

ZONE NO. 11

RESTRICTED TO FOLLOWING COALS—Virginia (L. & N. R.R.), Tennessee (M. R.R.), West Virginia (Southern), Illinois, Indiana, Kentucky (Eastern and Western).

BOUNDARIES—Southeastern: From San Pierre, Ind., via N. Y. C. R. R. north to South Bend, Ind., thence via M. C. R. R. to Michigan-Indiana state line. **Western and Northern:** From San Pierre, Ind., north to Michigan City, thence along Lake Michigan and Indiana-Michigan state line to M. C. R. R. from South Bend, Ind., to Niles, Mich.

ZONE NO. 12

RESTRICTED TO FOLLOWING COALS—Indiana, Illinois (Danville district on Wabash Ry. only).

BOUNDARIES—Northeastern— From Monon, Ind., via C. I. & L. Ry. to Indianapolis, Ind., thence via C. C. C. & St. L. Ry. through Greensburg to North Vernon, Ind., thence via P. C. C. & St. L. R. R. to Madison, Ind. **Southwestern:** From Monon, Ind., via C. I. & L. Ry. to Louisville, Ky., thence via Ohio River to Madison, Ind.

ZONE NO. 13

RESTRICTED TO FOLLOWING COALS—Kentucky (Western).

BOUNDARIES—Northern and Eastern: From Cairo, Ill., along Ohio River (north bank) to Louisville, Ky., thence south via L. & N. R. R. from Louisville through Bowling Green, Ky., including Glasgow and Scottsville branches, to Kentucky-Tennessee state line. **Western and Southern:** From Cairo, Ill., via I. C. R. R. through Fulton, Ky., to Kentucky-Tennessee state line, thence east via state line to L. & N. R. R. running from Franklin, Ky., to Mitchellville, Tenn.

ZONE NO. 14

RESTRICTED TO FOLLOWING COALS—Indiana, Kentucky (Eastern), West Virginia (Northern and Southern), Virginia (L. & N.), Tennessee (M. R.R.), Michigan (on G. R. & I. Ry. only).

BOUNDARIES—Northern and Western: From Mackinaw City, east bank of Lake Michigan, to Benton Harbor, Mich., thence via C. C. C. & St. L. Ry. to Niles, thence via M. C. R. R. to Michigan-Indiana state line. **Eastern and Southern:** From Mackinaw City via G. R. & I. Ry. and branches to Michigan-Indiana state line, thence west via state line to M. C. R. R. running from Niles to South Bend, Ind.

ZONE NO. 15

RESTRICTED TO FOLLOWING COALS—Illinois, Indiana, Kentucky (Eastern and Western), West Virginia (Northern and Southern), Virginia (L. & N.), Tennessee (M. R.R.), Michigan.

BOUNDARIES—Northern and Western: From Benton Harbor, Mich., via Lake Michigan to Indiana-Michigan state line. **Eastern and Southern:** From Benton Harbor, Mich., via C. C. C. & St. L. Ry. to Niles, thence via M. C. R. R. to Indiana-Michigan state line, thence west via state line to Lake Michigan.

ZONE NO. 16

RESTRICTED TO FOLLOWING COALS—Indiana, Illinois (Danville district on Wabash Ry. only), Kentucky (Eastern), West Virginia (Southern).

BOUNDARIES—Northern: Michigan-Indiana state line from G. R. & I. Ry. west to M. C. R. R. running from Niles, Mich., to South Bend, Ind. **Western:** Via N. Y. C. R. R. South Bend to San Pierre, thence via C. I. & L. Ry. through Monon to Indianapolis, thence via C. C. C. & St. L. Ry. Indianapolis to Greensburg, Ind. **Eastern:** G. R. & I. Ry. from Michigan state line south to Richmond, Ind., thence via P. C. C. & St. L. R. R. to Greensburg, Ind.

ZONE NO. 17

RESTRICTED TO FOLLOWING COALS—Virginia (L. & N. R.R.), Kentucky (Eastern), Tennessee (M. R.R.), West Virginia (Southern).

BOUNDARIES—From Cincinnati north via P. C. C. & St. L. Ry. to Richmond, Ind., thence west to Rushville, Ind., thence south via C. C. C. & St. L. R. R. through Greensburg, thence east to Cincinnati, O.

ZONE NO. 18

RESTRICTED TO FOLLOWING COALS—Virginia (L. & N. R.R.), Kentucky (Southern), Tennessee (M. R.R.).

BOUNDARIES—Northern and Western: Cincinnati, Ohio, via C. C. C. & St. L. Ry. through Greensburg, to North Vernon, Ind., thence via P. C. C. & St. L. R. R. to Madison, Ind. **Eastern and Southern:** North bank Ohio River, Cincinnati, Ohio, to Madison, Ind.

ZONE NO. 19

RESTRICTED TO FOLLOWING COALS—Kentucky (Eastern), Tennessee (M. R.R.), West Virginia (Southern, also Eastern, to points on C. & O. Ry. from Catlettsburg, Ky., to Cincinnati, Ohio).

BOUNDARIES—Northern and Eastern: From Louisville, Ky., via Ohio River and Big Sandy River to Kentucky-Virginia-West Virginia state line. **Western and Southern:** From Louisville, Ky., to Lebanon Junction to Bowling Green, Ky., to Mitchellville, Tenn., including Glasgow and Scottsville (Kentucky) branches, thence via Kentucky-Tennessee state line and Kentucky-Virginia state line via Tug River to Big Sandy River.

ZONE NO. 20

RESTRICTED TO FOLLOWING COALS—Virginia (L. & N. R.R.), Kentucky, (Eastern), Tennessee (M. R.R.), West Virginia (Northern and Southern), Indiana, Illinois (Danville district on Wabash Ry. to points in Indiana only), Ohio, Michigan.

BOUNDARIES—Southern and Eastern: From Richmond, Ind., east via P. C. C. & St. L. R. R. to Ohio state line, thence north via state line to Michigan state line, thence via N. Y. C. R. R. to Jackson, Mich., thence via M. C. R. R. to Lansing, thence via P. M. Ry. through Ionia to Howard City, Mich. **Western:** From Howard City, Mich., via G. R. & I. Ry. through Fort Wayne to Richmond, Ind.

ZONE NO. 21

RESTRICTED TO FOLLOWING COALS—Virginia (L. & N. R.R.), Kentucky (Eastern), Tennessee (M. R.R.), West Virginia (Northern and Southern), Ohio, Michigan.

BOUNDARIES—Northern and Eastern: From Mackinaw City, Mich., along the eastern boundary of Michigan (lower peninsula) and Ohio to Toledo, Ohio, thence via C. C. C. & St. L. Ry. through Bellefontaine to Dayton, Ohio. **Western and Southern:** From Mackinaw City, Mich., via G. R. & I. Ry. to Howard City, thence via P. M. Ry. through Ionia to Lansing, Mich., thence via M. C. R. R. to Jackson, thence via N. Y. C. R. R. to Indiana-Michigan-Ohio state line, thence south along state line and P. C. C. & St. L. R. R. running from Richmond, Ind., to Dayton, Ohio.

ZONE NO. 22

RESTRICTED TO FOLLOWING COALS—Virginia (L. & N. R.R.), Kentucky, (East-

ern), Tennessee (M. R.R.), West Virginia (Southern), Ohio.

BOUNDARIES—From Cincinnati, Ohio, north via C. C. C. & St. L. Ry. to Dayton, Ohio, thence via P. C. C. & St. L. R.R. west to Richmond, Ind., thence southeast via P. C. C. & St. L. R.R. to Cincinnati, Ohio.

ZONE NO. 23

RESTRICTED TO FOLLOWING COALS

—Kentucky (Northeastern), West Virginia (Northern and Southern, also Eastern, along main lines of C. & O. Ry. and N. & W. Ry. to Columbus and Cincinnati, Ohio) Ohio.

BOUNDARIES—Northern and Eastern: From Toledo, Ohio, via south bank of Lake Erie to Sandusky, Ohio, thence via P. C. C. & St. L. R.R. through Columbus, thence via N. & W. Ry. through Circleville to Chillicothe. Western and Southern: From Toledo, Ohio, via C. C. C. & St. L. Ry. through Springfield to Dayton, Ohio, thence via B. & O. R. R. through Washington C. H. to Chillicothe, Ohio.

ZONE NO. 24

RESTRICTED TO FOLLOWING COALS

—Kentucky (Northeastern), West Virginia (Southern, also Eastern, along main lines of C. & O. Ry. and N. & W. Ry. to Columbus and Cincinnati, Ohio), Ohio.

BOUNDARIES—Northern and Eastern: From Dayton, Ohio, via B. & O. R.R. through Washington C. H. to Chillicothe, thence via N. & W. Ry. to Waverly, thence via C. & O. Northern Ry. to Portsmouth. Western and Southern: From Dayton, Ohio, via C. C. C. & St. L. Ry. to Cincinnati, Ohio, thence via north bank of Ohio River to Portsmouth, Ohio.

ZONE NO. 25

RESTRICTED TO FOLLOWING COALS

—West Virginia (Northern, also Eastern, along main lines of C. & O. Ry. and N. & W. Ry. to Columbus and Cincinnati, Ohio), Ohio.

BOUNDARIES—Northern and Eastern: From Bucyrus, Ohio, via T. & O. C. Ry. to Thurston, Ohio, thence via Z. & W. Ry. through Fultonham to Zanesville, thence via Z. & W. Ry., K. & M. Ry. to Athens. Western and Southern: From Bucyrus, Ohio, via P. C. C. & St. L. R.R. to Marion, Ohio, thence via H. V. Ry. to Columbus, thence via N. & W. Ry. to Chillicothe, thence via B. & O. Ry. to Athens, Ohio.

ZONE NO. 26

RESTRICTED TO FOLLOWING COALS

—Ohio.

BOUNDARIES—Northern and Eastern: From Sandusky, Ohio, via south bank of Lake Erie to Lorain, thence via W. & L. E. Ry. through Wellington to Pittsburgh Junction, thence via P. & W. V. Ry. through Mingo Junction to Ohio River. Southern and Western: From Sandusky, Ohio, via P. C. C. & St. L. R.R. to Bucyrus, Ohio, thence via T. & O. C. Ry. to Thurston, thence through Zanesville to Athens, thence via K. & M. Ry. through Athens to Middleport, thence via Ohio River (north bank) to P. & W. V. Ry. opposite Mingo Junction.

ZONE NO. 27

RESTRICTED TO FOLLOWING COALS

—Pennsylvania, Ohio.

BOUNDARIES—Northern and Western: Along south bank Lake Erie from Conneaut, Ohio, to Lorain, Ohio, thence via W. & L. E. Ry. through Wellington to Pittsburgh Junction, thence via P. & W. V. Ry. through Mingo Junction to Ohio River. Eastern and Southern: From Conneaut, Ohio, via Pennsylvania-Ohio state line to East Liverpool, Ohio, thence via Ohio River to P. & W. V. Ry. at a point opposite Mingo Junction.

ZONE NO. 28

RESTRICTED TO FOLLOWING COALS

—No change contemplated in this plan, except that low-volatile coal in the Pocahontas, Tug River and New River districts on the N. & W. R. R. and the C. & O. Ry. and the Virginian Ry., and Clinch Valley districts in Tazewell and eastern Russell Counties along the N. & W. R. R., also high-volatile east of Charleston, W. Va., on C. & O. Ry. and east of Iaeger, W. Va., on N. & W. R. R. will be restricted to the District of Columbia, (except C. & O. Ry.) Virginia, (including tide-water terminals) also points in West Virginia on the direct line of the C. & O. Ry. and N. & W. R. R. east and west bound and Virginia Ry. east bound.

BOUNDARIES—All territory east and northeast of Ohio, Kentucky and Virginia, including New England.

ZONE NO. 29

RESTRICTED TO FOLLOWING COALS

—Ohio, West Virginia (Northern, also

Eastern, to points on the direct lines of the C. & O. Ry. and N. & W. Ry.).

BOUNDARIES—Northern and Eastern: From Chillicothe, Ohio, via B. & O. R.R. to Athens, thence via K. & M. Ry. to Middleport, thence via Ohio River (north bank) to Ironton, Ohio. Western and Southern: From Chillicothe, Ohio, via N. & W. Ry. to Waverly, thence via C. & O. N. Ry. to Portsmouth, thence via Ohio River (north bank) to Ironton, Ohio.

ZONE NO. 30

RESTRICTED TO FOLLOWING COALS

—No change.

BOUNDARIES—All territory west of the following state lines: North Dakota, South Dakota, Nebraska, Kansas, Oklahoma and Texas.

ZONE NO. 31

RESTRICTED TO FOLLOWING COALS—North Dakota, Wyoming, Montana and other fields east of the Rocky Mountains, docks.

BOUNDARIES—All territory in North Dakota west of the Missouri River.

ZONE NO. 32

RESTRICTED TO FOLLOWING COALS—North Dakota, South Dakota, Wyoming, Montana, docks.

BOUNDARIES—Northern, Western and Southern: North boundary of North Dakota to Montana, thence south to and via Missouri River to Mobridge, S. D., thence via C. M. & St. P. Ry. through Aberdeen to Bigstone City, S. D. Eastern: East boundary of North Dakota, thence via Minnesota-South Dakota state line to Bigstone City, S. D.

ZONE NO. 33

RESTRICTED TO FOLLOWING COALS—South Dakota, Wyoming, Montana and other fields east of the Rocky Mountains, North Dakota, docks.

BOUNDARIES—Northern and Eastern: From Montana-North Dakota-South Dakota state line to the Missouri River, thence via Missouri River to South Dakota-Nebraska state line. Western and Southern: Western and southern state boundary of South Dakota.

ZONE NO. 34

RESTRICTED TO FOLLOWING COALS—North Dakota, South Dakota, Wyoming, Montana, Illinois (summer), docks.

BOUNDARIES—Southwestern: From Mobridge, S. D., via Missouri River to Sioux City, Ia. Northern and Eastern: From Mobridge, S. D., via C. M. & St. P. Ry. through Aberdeen, S. D., to Bigstone City, S. D., thence via Minnesota-South Dakota state line and Iowa-South Dakota state line to Sioux City, Ia.

ZONE NO. 35

RESTRICTED TO FOLLOWING COALS—Iowa, Kansas, Missouri, Arkansas, Oklahoma, Colorado and other fields east of the Rocky Mountains, Wyoming.

BOUNDARIES—Entire state of Nebraska.

ZONE NO. 36

RESTRICTED TO FOLLOWING COALS—Kansas, Missouri, Iowa, Arkansas, Oklahoma, Colorado (Southern).

BOUNDARIES—Entire state of Kansas.

ZONE NO. 37

RESTRICTED TO FOLLOWING COALS—Oklahoma, Missouri, Arkansas, Kansas, Colorado, New Mexico, Texas.

BOUNDARIES—Entire state of Oklahoma.

ZONE NO. 38

RESTRICTED TO FOLLOWING COALS—New Mexico, Colorado, Texas.

BOUNDARIES—All Texas territory west of Pecos River.

ZONE NO. 39

RESTRICTED TO FOLLOWING COALS—Colorado, New Mexico, Arkansas, Oklahoma, Texas.

BOUNDARIES—Northern and Eastern: From New Mexico-Oklahoma-Texas state line east along northern border of Texas to Arkansas-Louisiana-Texas state line, thence south to Logansport, La., thence via H. E. & W. T. Ry. to Houston, via G. H. & H. R.R. to Galveston, thence Gulf of Mexico to Rio Grande River. Southwestern: From New Mexico-Oklahoma-Texas state line to Pecos River, thence via Pecos River to Rio Grande River thence via Rio Grande River to the Gulf of Mexico.

ZONE NO. 40

RESTRICTED TO FOLLOWING COALS—Kentucky (Western), Alabama, Texas.

BOUNDARIES—Northwestern: From Logansport, La., via H. E. & W. T. Ry.

to Houston, Texas, thence via G. H. & H. R. R. to Galveston. Eastern and Southern: From Logansport, La., along Louisiana-Texas state line to the Gulf of Mexico.

ZONE NO. 41

RESTRICTED TO FOLLOWING COALS—Arkansas, Illinois (summer), Iowa, Kansas, Missouri, Oklahoma, docks.

BOUNDARIES—Northern and Western: From Minnesota-Iowa state line directly south of Gordonsville, Minn., to Iowa-Minnesota-South Dakota state line, thence directly south along Iowa-South Dakota state line to Rock Valley, Ia. Eastern and Southern: From Iowa-Minnesota state line directly south of Gordonsville, Minn., via C. R. I. & P. Ry. to Macon City, Ia., thence via C. M. & St. P. Ry. to Rock Valley, Ia.

ZONE NO. 42

RESTRICTED TO FOLLOWING COALS—Arkansas, Iowa, Kansas, Missouri, Oklahoma.

BOUNDARIES—Northeast: From Sioux City, Ia., via C. M. & St. P. Ry. through Manilla and Adel to Des Moines, thence via C. B. & Q. R. R. through Chariton to Albia, thence via W. Ry. to Moravia, Ia., thence via C. M. & St. P. Ry. through Seymour to Missouri-Iowa state line. Western and Southern: From Sioux City, Ia., via Missouri River (east bank) to Iowa-Missouri state line, thence via Missouri state line, north boundary, to C. M. & St. P. Ry. line running south from Seymour, Ia.

ZONE NO. 43

RESTRICTED TO FOLLOWING COALS—Iowa, Arkansas, Kansas, Missouri, Oklahoma.

BOUNDARIES—Northeastern and Southern: Iowa-Missouri state line from Missouri River to C. M. & St. P. Ry. running south from Moravia, Ia., through Chillicothe, Mo., thence via W. Ry. through Huntsville to Moberly, thence via M. K. & T. Ry. through New Franklin to North Jefferson City, thence via western boundary of Cole, Miller and Pulaski Counties, Mo., to St. L. S. F. Ry. thence via St. L. S. F. Ry. through Lebanon, Springfield, to Missouri-Oklahoma state line. Western: Western boundary of Missouri.

ZONE NO. 44

RESTRICTED TO FOLLOWING COALS—Arkansas, Illinois, Kansas, Missouri, Oklahoma, Texas.

BOUNDARIES—Northern and Eastern: From Arkansas-Missouri-Oklahoma state line east to Mississippi River, thence via Mississippi River (west bank) to Memphis, Tenn. Western and Southern: From Arkansas-Missouri-Oklahoma state line south to C. R. I. & P. Ry. running from Howe, Okla., through Mansfield, Danville and Little Rock, Ark., to Memphis, Tenn.

ZONE NO. 45

RESTRICTED TO FOLLOWING COALS—Alabama, Arkansas, Illinois (only on lines of St. L. S. W. Ry. and St. L. I. M. & S. Ry.), Kansas, Missouri, Oklahoma, Kentucky (Western), Texas.

BOUNDARIES—Northern and Eastern: From Arkansas-Oklahoma state line via C. R. I. & P. Ry. running from Howe, Okla., through Mansfield, Danville and Little Rock, Ark., to Memphis, Tenn., thence via Mississippi River (west bank) to Arkansas-Louisiana state line. Western and Southern: South along Arkansas-Oklahoma state line from C. R. I. & P. Ry. Howe, Okla., to Mansfield, Ark., to Arkansas-Louisiana-Texas state line, thence east along Arkansas-Louisiana state line to the Mississippi River.

ZONE NO. 46

RESTRICTED TO FOLLOWING COALS—Alabama, Arkansas, Illinois (only on lines of St. L. S. W. Ry. and St. L. I. M. & S. Ry.), Kentucky (Western), Texas.

BOUNDARIES—Northern and Eastern: From Arkansas-Louisiana-Texas state line east to the Mississippi River, thence along Mississippi River (west bank) to the Gulf of Mexico. Western and Southern: Louisiana-Texas state line to the Gulf of Mexico, thence to Mississippi River.

ZONE NO. 47

RESTRICTED TO FOLLOWING COALS—Kentucky (Western).

BOUNDARIES—Northern and Eastern: From Kentucky-Tennessee state line south of Fulton, Ky., east to L. & N. R.R. passing south through Mitchellville, Tenn., through Nashville and Columbia to Iron City, Tenn., including Scottsville and Harts-ville, Ky., branches. Western and Southern: From Kentucky-Tennessee state line south of Fulton, Ky., via I. C. R.R. to Memphis, thence east via N. C. & St. L. Ry. to Perry-

ville, thence along Tennessee River (east bank) to Alabama-Mississippi-Tennessee state line, thence via Alabama-Tennessee state line to Iron City, Tenn.

ZONE NO. 48

RESTRICTED TO FOLLOWING COALS—Alabama.

BOUNDARIES—Northern and Eastern: From Memphis, Tenn., via N. C. & St. L. Ry. to Perryville, thence via Tennessee River (west bank) to Alabama-Mississippi-Tennessee state line. **Western and Southern:** From Memphis to Arkansas-Mississippi-Tennessee state line, thence east along Mississippi-Tennessee state line to the Tennessee River.

ZONE NO. 49

RESTRICTED TO FOLLOWING COALS—Alabama, Kentucky (Western).

BOUNDARIES—Northern and Eastern: Tennessee-Mississippi state line and Alabama-Mississippi state line. **Western and Southern:** East bank Mississippi River to the Gulf of Mexico.

ZONE NO. 50

RESTRICTED TO FOLLOWING COALS—Kentucky (Southern), Virginia (all Black Mountain and Stonega districts in Lee, Dickenson, Wise, and western Russell Counties of Virginia), Kentucky (Western), Tennessee, Georgia.

BOUNDARIES—Northeastern: From Columbia, Tenn., via L. & N. R. R. to Baugh, Tenn. **Western and Southern:** From Columbia, Tenn., via L. & N. R. R. through Lawrenceburg to Iron City, thence east via Alabama-Tennessee state line to Baugh, Tenn.

ZONE NO. 51

RESTRICTED TO FOLLOWING COALS—Alabama, Kentucky (Southern), Virginia (all Black Mountain and Stonega districts in Lee, Dickenson, Wise, and western Russell Counties of Virginia), Tennessee, Georgia.

BOUNDARIES—Northern: Tennessee-Alabama state line. **Southwestern and Eastern:** Tennessee River.

ZONE NO. 52

RESTRICTED TO FOLLOWING COALS—Alabama.

BOUNDARIES—Northern and Eastern: Tennessee River to Alabama-Georgia state line, thence south along state line to Apalachicola River, thence via said river to the Gulf of Mexico. **Western and Southern:** Alabama-Mississippi state line to the Gulf of Mexico.

ZONE NO. 53

RESTRICTED TO FOLLOWING COALS—Kentucky (Southern, also Western, to points on N. C. & St. L. and T. C. R. R. Nashville to Old Hickory and Hermitage, Tenn. inclusive), Virginia (all Black Mountain and Stonega districts in Lee, Dickenson, Wise, and western Russell Counties of Virginia, also Clinch Valley district in eastern Russell and Tazewell Counties), West Virginia (Eastern, also Southern, on C. & O. Ry. east of Charleston and N. & W. Ry. east of Iaeger, W. Va.), Georgia, Tennessee.

BOUNDARIES—Northern and Eastern: From Mitchellville, Tenn., east along Tennessee-Kentucky state line to Virginia state line, thence via L. & N. R. R. to Norton, thence via N. & W. R. R. through Roanoke, Petersburg (and branches of N. & W. R. R. at Petersburg) to Norfolk, thence south to

Virginia-Carolina state line. **Western and Southern:** From Mitchellville, Tenn., via L. & N. R. R. through Nashville and Columbia to Baugh, Tenn., including Scottsville, Ky., branch, thence along Alabama-Tennessee-Georgia state line, thence via North Carolina-Tennessee state line, thence via North Carolina-Virginia state line to the Atlantic Ocean.

ZONE NO. 54

RESTRICTED TO FOLLOWING COALS—Kentucky (Southern), Tennessee, Virginia (all Black Mountain and Stonega districts in Lee, Dickenson, Wise, and western Russell Counties of Virginia), Alabama, Georgia.

BOUNDARIES—State of Georgia and all of Florida east of Apalachicola River.

ZONE NO. 55

RESTRICTED TO FOLLOWING COALS—Kentucky (Southern), Virginia (all Black Mountain and Stonega districts in Lee, Dickenson, Wise, and western Russell Counties of Virginia), Tennessee, Georgia, West Virginia (Eastern).

BOUNDARIES—Northern and Eastern: From Georgia-North Carolina-South Carolina state line to the line of the Sou. Ry. running south from Charlotte, N. C., through Chester to Columbia, S. C., thence via S. A. L. Ry. to Denmark, thence via Sou. Ry. to Charleston, S. C. **Western and Southern:** South Carolina-Georgia state line to the Atlantic Ocean.

ZONE NO. 56

RESTRICTED TO FOLLOWING COALS—Kentucky (Southern), Tennessee, Virginia (all Black Mountain and Stonega Districts in Lee Dickenson, Wise and western Russell Counties of Virginia, and Clinch Valley districts in Tazewell and eastern Russell Counties along the N. & W. Ry.), West Virginia (Eastern, on C. & O. Ry. and N. & W. Ry. and Virginian Ry.).

BOUNDARIES—All of North Carolina, and that portion of South Carolina on and east of the line of the Sou. Ry. Charlotte, N. C., through Chester to Columbia, thence via S. A. L. Ry. to Denmark, thence via Sou. Ry. to Charleston, S. C.

ZONE NO. 57

RESTRICTED TO FOLLOWING COALS—No change contemplated. Coal to be supplied generally from low-volatile fields.

BOUNDARIES—That portion of Virginia on and north of the N. & W. R. R. Graham, Va., to Norfolk, Va., including branches at Petersburg.

EXPLANATION OF ABBREVIATIONS AND TERMS USED

B. & O.	Baltimore & Ohio R. R.
C. & C.	Coal & Coke Ry.
C. & E. I.	Chicago & Eastern Illinois R. R.
C. & N. W.	Chicago & Northwestern Ry.
C. & O.	Chesapeake & Ohio Ry.
C. & O. N.	Chesapeake & Ohio Northern Ry.
C. B. & Q.	Chicago, Burlington & Quincy R. R.
C. C. & O.	Carolina, Clinchfield & Ohio Ry.
C. C. C. & St. L.	Cleveland, Cincinnati, Chicago & St. Louis Ry.
C. I. & L.	Chicago, Indianapolis & Louisville Ry.
C. M. & St. P.	Chicago, Milwaukee & St. Paul Ry.

C. R. I. & P.

E. R. R.

G. B. & W.

G. H. & H.

G. R. & I.

H. E. & W. T.

H. V.

I. C.

K. & M.

K. & W. V.

L. & N.

L. F.

M. C.

M. K. & T.

M. R. R.

M. St. P. & S. S. M.

N. & W.

N. C. & St. L.

N. Y. C.

P. & W. V.

P. C. C. & St. L.

P. Co.

P. M.

Q. & C.

S. A. L.

Sou. Ry.

St. L. I. M. & S.

St. L. S. F.

St. L. S. W.

T. & O. C.

T. C.

V. Ry.

W. & L. E.

W. M.

W. Ry.

Y. & O. R.

Z. & W.

Summer

Winter

Eastern

Northeastern

Northern

Southern

Western

Eastern

Northern

Southern

Western

Eastern

Northern

Southern

Western

Eastern

Northern

Southern

Chicago, Rock Island & Pacific Ry.

Erie R. R.

Green Bay & Western R. R.

Galveston, Houston & Henderson R. R.

Grand Rapids & Indiana Ry.

Houston East & West Texas Ry.

Hocking Valley Ry.

Illinois Central R. R.

Kanawha & Michigan Ry.

Kanawha & West Virginia R. R.

Louisville & Nashville R. R.

Long Fork R. R.

Michigan Central R. R.

Missouri Kansas & Texas R. R.

Middlesborough R. R.

Minneapolis, St. Paul & Sault Ste. Marie Ry.

Norfolk & Western Ry.

Nashville, Chattanooga & St. Louis Ry.

New York Central R. R.

Pittsburgh & West Virginia Ry.

Pittsburgh, Cincinnati, Chicago & St. Louis Ry.

Pennsylvania Co.

Pere Marquette Ry.

Queen & Crescent Route.

Seaboard Air Line Ry.

Southern Ry.

St. Louis, Iron Mountain & Southern Ry.

St. Louis-San Francisco Ry.

St. Louis-Southwestern Ry.

Toledo & Ohio Central Ry.

Tennessee Central R. R.

Virginian Ry.

Wheeling & Lake Erie Ry.

Western Maryland Ry.

Wabash Ry.

Youngstown & Ohio River R. R.

Zanesville & Western Ry.

From Apr. 1 to and including Sept. 30.

From Oct. 1 to and including Mar. 31.

KENTUCKY

All mines in eastern Kentucky on Sou. Ry. (Q.&C.), L. & N., C. & O., N. & W. and L. F. Sandy Valley & Elkhorn Ry., L. F., C. & O., and N. & W. in Thacker, Big Sandy and Elkhorn districts.

L. & N. in Hazard and Elkhorn districts.

Sou. Ry. (Q.&C.) and L. & N. in Harlan, Jellico and Southern Appalachian districts.

L. & N. and I. C. west of Louisville, Ky.

WEST VIRGINIA

C. & O. and N. & W. in low-volatile fields of Pocahontas, Tug River and New River districts.

K. & M., K. & W. V. and C. & C. west of Dundon.

C. & O. and N. & W. in Kanawha, Kenova and Thacker districts.

Key to Producing Districts

Location of Producing Districts	Numbers of Consuming Zones to which restricted
Alabama	40, 45, 46, 48, 49, 51, 52, 54.
Arkansas	5, 35, 36, 37, 39, 41, 42, 43, 44, 45, 46.
California	30.
Colorado	30, 31, 33, 35, 36, 37, 38, 39.
Docks ¹	1, 2, 3, 4, 4A, 6A, 31, 32, 33, 34, 41.
Georgia	50, 51, 53, 54, 55.
Illinois (summer)	2, 34, 41.
Illinois	3, 4, 4A, 5, 6, 6A, 7, 8, 9, 10 ² , 11, 12 ² , 15, 16 ² , 20 ² , 44, 45 ² , 46 ² .
Indiana	3, 8, 9, 10, 11, 12, 14, 15, 16, 20.
Iowa	24, 5, 7, 35, 36, 41, 42, 43.
Kansas	5, 35, 36, 37, 41, 42, 43, 44, 45.
Kentucky:	
Eastern	11, 14, 15, 16, 17, 19, 20, 21, 22.
Northeastern	23, 24.
Southern	18, 50, 51, 53, 54, 55, 56.

Western	3, 4, 6, 6A, 9, 10, 11, 13, 15, 40, 45, 46, 47, 49, 50, 53 ² .
Maryland	57.
Michigan	14, 15, 20, 21.
Missouri	5, 35, 36, 37, 41, 42, 43, 44, 45.
Montana	30, 31, 32, 33, 34, 35.
New Mexico	30, 35, 37, 38, 39.
North Dakota	1, 2, 31, 32, 33, 34.
Ohio	14 ² , 20, 21, 22, 23, 24, 25, 26, 27, 28 ² , 29.
Oklahoma	5, 35, 36, 37, 39, 41, 42, 43, 44, 45.
Oregon	30.
Pennsylvania	27, 28, 57.
South Dakota	1, 2, 32, 33, 34.
Tennessee (M. R. R.)	11, 14, 15, 17, 18, 19, 20, 21, 22.
Tennessee	50, 51, 53, 54, 55, 56.
Texas	37, 38, 39, 40, 44, 45, 46.
Utah	30, 31, 33, 35, 36.
Virginia (L. & N.)	11, 14, 15, 17, 18, 20, 21, 22.
Virginia ⁴	50, 51, 53, 54, 55, 56.
Virginia ²	53, 56.

West Virginia:	
Eastern	19, 23 ¹⁰ , 24 ¹⁰ , 25 ¹⁰ , 29 ¹⁰ , 53, 55, 56.
Northern	14, 15, 20, 21, 23, 25, 29.
Southern	11, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 53.
Wyoming	30, 31, 32, 33, 34, 35.
¹ South bank Lake Superior and west bank Lake Michigan.	
² From Danville district on Wabash Ry. only.	
³ Only on lines of St. L. I. M. & S. and St. L. S. W. Rys.	
⁴ To points in Iowa only.	
⁵ To points on N. C. & St. L. and T. C. Nashville to Hermitage and Old Hickory, Tenn., inclusive.	
⁶ On G. R. & I. only.	
⁷ From mines in Columbiana County, O. only.	
⁸ All Black Mountain and Stonega districts in Lee, Wise, Dickenson and western Russell Counties.	
⁹ Clinch Valley districts in Tazewell and eastern Russell Counties.	
¹⁰ Along lines of C. & O. and N. & W. to Cincinnati and Columbus, O.	



Cyrus Garnsey, Jr., Appointed Assistant Fuel Administrator

Appointment of Cyrus Garnsey, Jr., as Assistant Federal Fuel Administrator, is regarded as being a direct recognition of the work of the engineers' committee, of which Mr. Garnsey was a member. Mr. Garnsey will have administrative charge of all activities of the Fuel Administration, with the exception of distribution and of the oil section. The office of assistant administrator is a new one, so that Mr. Garnsey replaces no member of the present staff.

While Mr. Garnsey is better known as an Alabama operator, he also was for many years an extensive operator of retail yards throughout the South. At one time he operated four retail yards in New Orleans. He is, however, a native of Seneca Falls, N. Y., where he was born Apr. 10, 1861. In 1880 he went to Kansas City as private secretary to the general manager of the Kansas Rolling Mill Co. A few years later he became comptroller of the Kansas City, Fort Scott & Memphis Railroad Co. As the terminus of this railroad was at Birmingham, he was thrown in close relationship with the coal business, with which he became very familiar. In 1899 he became the executive head of the Galloway Coal Co., of Memphis, in which he was financially interested. This company operated mines in Alabama. Mr. Garnsey was one of the proprietors of the Patterson Transfer Co., a large transfer and warehousing concern of Memphis. Mr. Garnsey retired from active business Jan. 1, 1917, at which time he disposed of all his mining interests.

Fuel Administrator Repeals Orders Diverting Coal to New England

Special orders providing for the diversion of coal to New England, issued during the critical period of last winter, were revoked on May 3 by United States Fuel Administrator Garfield. These orders were no longer necessary in view of the inauguration of the zone system, regulating the production and transportation of coal and of the adoption of the system of district representatives of the Fuel Administration facilitating the filling of emergency and other essential requirements for bituminous coal from the different producing fields.

Provision for supplying coal to New England has been made in the zone system recently put into effect by the Fuel and Railroad Administrations. One of

the orders issued last winter provided for the diversion of 500 cars of bituminous coal daily, which was consigned to James J. Storrow, Federal Fuel Administrator for New England, with authority to him to place it where most needed. The order of Fuel Administrator Garfield revoking the orders affecting New England became effective May 8, 1918.

Weekly Production Statistics

By producing 11,668,000 tons of coal during the week ended Apr. 27, the mines of the country exceeded any week's production during the last twelve months. Telegraphic advices, however, show that this rate of production was not maintained during the week ended May 4. If the country's full requirements for coal this year are met, the average weekly production must exceed 12,000,000 tons.

Anthracite forwardings during the week ended Apr. 27 were 39,522 cars, nearly 400 cars in excess of forwardings for the week preceding.

Beehive coke production showed a decided trend upward, having been 652,000 tons for the week ended Apr. 27. Byproduct coke production totaled 475,979 tons, practically 90 per cent. of full time capacity of the country's byproduct ovens.

The estimates referred to above were made by C. E. Leshner, geologist in charge of coal statistics for the United States Geological Survey.

Restricts Hard Coal Movement to Canada

Plans for the restriction of the movement of anthracite coal from the United States to Canada during the present coal year have been formulated by the United States Fuel Administration in cooperation with the Fuel Controller of Canada. A representative of the United States Fuel Administrator attended a recent conference of representatives of coal operators, coal miners and railways in Canada, at which this problem was discussed.

The conference reached an agreement as to the movement of anthracite coal into Canada embracing the following: Anthracite coal supplies to points in western Canada will be materially restricted during the present coal year. No American anthracite will be available for shipment to points west of Winnipeg. The Canadian public, both east and west, must be given to understand distinctly that conservation of coal must be practiced to the utmost extent by all classes of consumers.

Harry D. Nims Resigns

Harry D. Nims has resigned his position with the Fuel Administration. Since the founding of the administration, Mr. Nims has occupied a position of great responsibility. He has had an important part in formulating the policies of the Fuel Administration and in defining its procedures. His resignation has been deferred several months at Dr. Garfield's request. He was forced, however, to take the action he did by the fact that he could no longer afford, financially, to contribute his services to the Government. In serving the Fuel Administration the length of time that he has, Mr. Nims feels that he has done his bit and, in justice to his family, must resume his law practice in New York City.

Government Coal Yard in Washington

An item in the forthcoming sundry civil bill will provide for the establishment in Washington of a Government coal yard. The Government's requirements in Washington will be met from that yard, in which a reserve will be built up in an effort to avoid an uncertain fuel supply during future winters. The public also is to have recourse to the yard, in case commercial stocks of coal should become exhausted.

New Prices for Bituminous Coal

New prices for bituminous coal, effective May 1, have been announced by the Fuel Administration as follows:

State or Field	Run-of-Mine	Prepared Sizes	Slack or Screenings
Indiana.....	\$2.00	\$2.20	\$1.70
Brazil Block.....	2.95	3.25	1.70
Montana.....	2.70	3.60	1.00
Illinois.....			
Macon County.....	2.25	2.50	1.70
Colorado.....			
Fremont County (operation of Williams- burgh Slope Coal Co. at Florence).....	2.25	4.25	1.25
Kentucky.....			
Knox & Whitley Counties (Blue Gem Coal mined by members of the Tri-county Blue Gem Coal Operator's Association)	3.55	3.80	2.40
Tennessee.....			
Campbell County (Blue Gem coal mined by members of the Tri-county Blue Gem Coal Operators' Association).....	3.55	3.80	2.40

Operators who have complied with the Washington wage agreement are permitted to add 45c. per ton to the foregoing prices.

Brief Washington Notes

George E. Warren, of Boston, Mass., has been named chief of the division of fuel and forage of the War Department.

A. M. Ogle, president of the Vandalia Coal Co., of Terre Haute, Ind., has joined the staff of J. D. A. Morrow, who is in charge of bituminous coal distribution for the Fuel Administration.

Albert H. Wiggin, state fuel administrator for New York, has tendered his resignation. This step has been made necessary, he explained, by the increasing work which is falling upon him as chairman of the Clearing House committee. Dr. Garfield has asked Mr. Wiggin if he will be able to continue as fuel administrator if he is furnished additional assistance.

The New York and Philadelphia Coal and Coke Co. must suspend business for five days and is otherwise penalized for violating the regulations of the Fuel Administration with regard to furnishing smokeless coal to ships which have to pass through the submarine zone.

Fuel Session at Spring Meeting of American Society of Mechanical Engineers

Recognizing the importance of the fuel question, the American Society of Mechanical Engineers, which holds its Spring Meeting at Worcester, Mass., June 4 to 7, has announced a session on Thursday morning, June 6, for five-minute presentations of data relating to fuel economy. This session has been planned by the Fuel Conservation Committee of the Engineering Council in order to assist Fuel Administrator Garfield in his nationwide campaign for fuel economy. A feature of this session will be the discussion of problems incident to the adverse fuel conditions of the past winter. A. A. Potter will present a paper entitled "An Investigation of the Fuel Problem in the Middle West."

Legal Department

BREACH OF COAL SALES CONTRACTS—On refusal of a contract seller of coal to deliver at the agreed price, he demanding an advanced price, the buyer, on accepting partial deliveries under the contract at the higher price, is entitled to recover the excess paid above the contract amount in order to secure delivery. But as to quantities called for by the agreement and undelivered, the buyer's measure of damage is the excess of the market value of the coal at the time and place when and where delivery should have been made above the contract price. (New York Supreme Court, Appellate Term; Hencken & Willenbrock Co. vs. Rosenwasser Bros.; 168 New York Supplement, 1097.)

STATUTE OF FRAUDS APPLIED—New York, like the other states, has a law known as the Statute of Frauds under which a contract to sell personal property in excess of a certain price is unenforceable unless evidenced in a writing signed by the party sought to be held, or unless there is at least a partial acceptance of delivery or a partial payment by the buyer. This statute was invoked the other day in defeat of a suit brought to recover \$929 as the agreed price of coal dust to be delivered to defendant. The agreement for sale in this case was verbal, and plaintiff, in order to bring its claim within the Statute of Frauds, asserted that there had been an acceptance of the coal dust by the defending buyer. This claim rested on the facts that the fuel had been unloaded at a dock and that the defendant's secretary had orally promised to send a check for the price. It appeared that the next day the defendant wrote plaintiff that the coal dust was "of very inferior quality, full of large lumps, and very sticky and greasy, and not of the quality represented. . . . Before paying this bill, it will be necessary to make us a decided reduction in price," etc. Holding that the plaintiff could not recover, the Appellate Term of the New York Supreme Court decided that there was nothing to show an acceptance of the coal dust, considering the fact that the defendant had a reasonable time in which to inspect the fuel, and indicated in the letter that acceptance would be conditioned upon the making of a deduction in the price. (A. Sidney Davison Coal Co. vs. Empire Brick and Supply Co., 168 New York Supplement, 534.)

EDITORIALS

Chance's Method of Coal Separation

IN THE present issue is given an abstract of Thomas M. Chance's article on "A New Method of Separating Materials of Different Specific Gravities." One may be permitted perhaps to question whether the principles suggested are as "new" as the writer of the article imagines. If the reader will take the trouble to consult Robert H. Richards' monumental and authoritative work on "Ore Dressing," he will find that there are two kinds of settling—free and hindered settling. In the one case—but why not use his own words:

Free settling is where the individual particles fall freely either in still water or against an opposing upward current, without being hindered by other particles. The classifiers and settling tanks are instances of this principle. Hindered settling is where the particles of mixed sizes, shapes and gravities in a crowded mass, yet free to move among themselves, are sorted in a rising current of water, the velocity of which is much less than the free-falling velocity of the particles, but yet enough so that the particles are in motion. The arrangement of the particles is so positive that if one of them be moved either upward or downward from its chosen companions, it will be found, when set free, to return immediately to practically the same group as before. The jig beds are instances of this principle.—Vol. 1, Chap. XII, p. 464.

Wherein does Mr. Chance's method differ from hindered settling as commonly described? Mr. Chance describes his method merely as an agitation of the liquid "by stirring arms, by propeller blades, by rotating disks and cones, by hydraulic jets, by upwardly rising liquid and other means." The agitation is therefore not necessarily such as to produce an upwardly rising current but, in every case illustrated and in the model presented, he has shown the influx of water as from below as in jigging and classification appliances. In Mr. Chance's separator the diligent inquirer will find more than a faint resemblance to the tubular classifier of Mr. Richards shown on page 611 of his book, the first edition of which appeared in 1903.

So much for the method of agitation and its similarity to that already in use; let us now inquire into the principle of the separator as Mr. Richards and Mr. Chance respectively enunciate it. The particles, as Mr. Richards views them, are shuttlecocks of sand with an uprising liquid as battledore. Mr. Chance, on the other hand, regards the liquid as of higher specific gravity and bases all his argument on the assumption that the artificial fluid of water and sand acts as if it were a syrup or solution of great density.

For this reason he expects that he will not be confronted with the necessity for sizing his material; the large and small will fall or rise together obedient to their specific gravities. In his view it is no more necessary than in the "float-and-sink test" of the ordinary washery to size the material to be treated. Somehow the agitation merely keeps the sand in solution, if that expression may be pardoned.

To Mr. Chance the action seems to be a free settling

in a liquid of high specific gravity, and not at all a hindered settling. There is of course a variation in the speed with which such settling takes place. In this speed naturally size and shape will function. But granted that you have a medium for free settlement, eventually all the material heavier than the composite specific gravity of the laden liquid will sink, whether it be large or small, so long as it does not consist of infinitesimal particles. The large pieces will fall first, but all will fall eventually.

So the question arises: Shall we call the Chance separation a free settling in a liquid of high specific gravity or a hindered settling in a liquid sustaining solid matter? The theories are so different that the principles of operation must necessarily be divergent.

But before the matter is dismissed recognition must be given to the fact that Mr. Chance does not use the material being classified as the material for densifying his liquid. His use of sands of varying density modifies the technique. In this his method appears to have real claims to newness. In the hindered settling reliance is placed not on a third body but on the body being settled. Here then is a real divergence, but it is one that makes for difficulty. We can separate coal from slate, but if we keep dumping in the material to be separated and drawing off the product it is only with difficulty that we shall maintain a liquid with any given composite specific gravity. Agitation may cost but little, but the recovery of the sand must be added to the expense. Viewing the matter as from the street, the process promises difficulties which it will take all Mr. Chance's known abilities to solve after the war is won.

Principal Problem for Chemists

OF ALL the problems for chemists, perhaps none is so pressing, and none seems to the tyro so easy, as to discover some way of converting the lower members of the hydrocarbon series—methane, ethane and ethylene—into higher members of the same or other series. If we could make methane and ethane into pentane, hexane and heptane, or ethylene into hexylene, and the like, these being liquids under ordinary conditions, we could convert and so condense some of the gases from byproduct ovens into gasoline and burn the others for power purposes and for coking.

The method would probably be equally available for use in connection with the distilling of coal at low temperatures. It would be possible also to turn the gas from our oil wells into a stable gasoline. If the process was reasonably cheap, it might conceivably be possible even to secure a product from the waste gases of the mines, as Governor Brumbaugh of Pennsylvania has advocated—but that is a far cry.

The immediate need is to convert the richer gas of coke and coal-distillation plants into liquids so that there will be a greater profit in operating such plants at the

mines. At present the gas of byproduct ovens has to be wasted if it is not produced in close proximity to points where the demands for power are large.

In converting methane into heptane, if the conversion could be accomplished, 9 per cent. of the hydrogen in the methane would be abstracted. While methane contains 25 per cent. of hydrogen, heptane has only 16 per cent. Ethylene has the same chemical analysis as hexylene. In the other series hydrogen must be added, but these are less important. The trick seems so easy, but Nature often seems firmly resolved to resist taking what appears on first sight to be the obvious course.

May Federal Railroads Lock Out Miners?

WE HAVE all roasted the mine worker who laid idle when the world waited for fuel. We have all berated the strikers and the makers of "holidays," real or feigned. "They had no right to strike. Could they not arbitrate their wages? Let them go on working and justice would be given them."

We believed that we had the Government with us in our censure. It is true, we did have the Fuel Administration with us, but the Railroad Administration, if it sided with this point of view, must have done it with a wink. While the patriotic mine worker could see the point and largely refused to strike when unruly men urged him to do so, the Railroad Administration, blind and determined, did as it pleased; for it has never had the coal shortage burned into its soul. It is well known that the railroads caused the fuel shortage; they are going to cause it again, and yet they go merrily on their way with complete indifference.

The mine worker is required to work at the price set whether he wants more or not. He is told to trust to the fairness of the Fuel Administration and the umpires appointed. But the Railroad Administration feels itself privileged at any time to lock out the mine worker in order to secure a lower price, to quit buying and to bring the nation and the coal industry to terms by class warfare, by the "lockout," in short. It is not willing to pay the Fuel Administration's price, and it will not be put off with umpires, however disinterested. The Government appoints its own arbiters, and it is the Government that goes back on them. It reverts to the supposedly forgotten "class struggle," to that quarrel between buyer and consumer which is analogous to the strife between servant and master.

There is something to be said for this way of doing business, especially in times of peace. But when the Government has preached that striking and locking out with an enemy at the door are inexcusable, on what imaginable basis of equity does this Railroad Administration stand? What excuse has it for its enormity? It would be scandalized if its employees would take an attitude such as it assumes. It would condemn them if they ventured to assert that they could sell their labor at their pleasure and fix their wage to suit their interest whether the nation won or lost the war.

But, to all appearance, the Railroad Administration autocratically believes itself superior to the moral code emboldened on its employees and will not buy coal at the price declared fair by the Fuel Administration. It will strike first, and when it starves for coal this winter it will commandeer all the coal it wants and let the

world go cold. Never was there anything less logical, more unreasonable, than this Frankenstein of a trust with which we are now confronted.

Fortunately its decision that it will buy only when it can get less than a fair price affects, at present, only certain parts of the country and not the whole, for the private consumer, in general, is not participating in the Railroad Administration's lockout, but is buying coal in accordance with the Fuel Administration's admonition and in harmony with the dictates of both patriotism and prudence.

But this does not exonerate the Railroad Administration. Its culpability is not redeemed by the fact that it leaves the burden of service on the private citizen, and crying "store coal" spikes the switch to its storage yards, causing the mines in certain parts of the country to shut down, muddling the zoning system and causing the coal industry to lose men. The railroads in the hand of the Government have proved more oppressive than when administered by private ownership.

Britain's Pocketed Coal Mines

THERE has been a general belief for many years that the Irish mines have been deliberately kept idle to satisfy the purposes of English landowners and capitalists. As a rule it is more profitable to tap coal fields by railroads and to operate mines than to avoid coal fields in railroad construction and keep them idle. However, conditions do obtain sometimes where contrary policies seem likely to prove profitable.

If, however, the coal fields of Ireland in general and the coal field referred to in the short article entitled "Britain's Pocketed Coal Mines" in particular are such wonderful opportunities for capital the authoritative "Coal Resources of the World" fails to evidence it.

Cole and Lyburn say that in the Leinster field, which O'Byrne so highly praises, only the Jarrow seam remains to be worked in the middle coal measures and even that seam is partly worked out. The coal is often less than one foot thick but in the Jarrow channel it may reach 4 ft. The best coal in the lower coal measures is the Skehana seam, which is in places 2 ft. thick with an average of 20 in. There are no upper coal measures. All the coals mentioned dip heavily and are much faulted. The other fields are but little better though the Ballycastle field of Antrim may contain some 6 ft. coal in spots, and this is tilted from 10 to 50 degrees.

Even if coal were found in Ireland equal to the English coal in quality and operative availability it does not follow that it would be able to hold its own. The English coal being located on the sea coast can be laid down with ease at any point on the Irish littoral. As all the larger Irish towns are along the coast that is an important advantage.

The Irish fields are small and with one exception well removed from the sea. They do not give any evidence of being operable to much advantage and, even if mined, their area is closely circumscribed. All the coal in Ireland over one foot thick and less than 4000 ft. deep if mined and delivered in the United States would supply the demand for only about four brief months; for according to the figures given by Cole and Lyburn there are only 198,000,000 short tons in the whole island from Ballycastle to Fastnet Light.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

The very dearth of outstanding labor news argues for the patriotism, the well-ordered patriotism of the mine worker. The mine worker has always been keen to assert his rights, but he has forgotten them now in the exercise of his duty as a citizen. The amazing news from Illinois about the coercion of men who will not work or who will not salute the flag before working shows that the workingman has not been a slow second to the operator in believing that nothing matters now but the war. Both mine operator and mine worker are making generous concessions to the nation and to one another, and that spirit should continue till the war comes to an end.

PANTHER VALLEY MEN OPPOSE WOMEN WORKERS

In the anthracite region the attitude toward the employment of women taken by the employees is unfortunate. We are quite ready to admit that there are parts of the country where there is no such scarcity as calls for the entry of women into industries unsuited to them, but the anthracite region is not one of these. The shortage of labor in that section of the coal fields is inflicting quite a loss on the nation. Anything within reason that will relieve it is deserving of a hearty welcome. However, it is pleasing to see that the men did not strike, but went at the matter the right way, putting the law into operation.

In that region the men who refused to buy Liberty Bonds were in many instances severely dealt with. The mine workers threatened to strike if these men were retained. At the Spring Mountain colliery of the Lehigh Valley Coal Co. one of the prominent union men, a pit committeeman, refused to buy Liberty Bonds and his name was dropped from the rolls by the company. It appears that he took out two bonds in his children's names. His fellow committeemen have threatened a strike should he fail to secure reinstatement.

OKLAHOMA SUFFERING USUAL SUMMER DULLNESS

The lack of orders in Oklahoma is alleged to be causing men to leave the mines for the farms. This condition is not new. Looking at the table on page 587 published in *Coal Age*, Mar. 30 of this year, it will be seen that Oklahoma in 1916 led in shortness of time worked, with only 178 days of operation. Her near neighbor, Arkansas, was next in order with 184 working days. Indiana followed with 187 days and Ohio with 197 days.

Miners living in states like Oklahoma and Arkansas never altogether lose the farming habit. It is likely that they will drift back to the mines this winter as they have in other winters, and the country will be advantaged by the wheat, corn and cotton they will produce. A few months' work will take care of the Oklahoma needs and nothing will be gained by hauling the coal that the state produces into a large territory to which it is not normally tributary. The cars will go to other states where the demand for coal is more stable and factories call for coal the year round.

CONSUMERS WANT THEIR HARD COAL SCREENED

Some of the shortage of work in Arkansas has been due to a disagreement between producer and consumer. The Kansas City retailers have been demanding screened coal from the semi-anthracite producers of Arkansas. The operators declare that they cannot sell the screenings and cannot afford to prepare lump coal at Government prices, dumping the screened coal on the ground. The chairman of the fuel administration of Kansas City, Walter L. Lampkin, is said to have written a letter to Senator J. A. Reed

declaring that the mine operators in the semi-anthracite fields of Arkansas were deliberately cutting down production to create an artificial shortage.

The troubles in Canada are apparently not serious. The mine workers of the Nova Scotia Steel and Coal Co. say that promises made to them by minor officials have not been kept and that the head office is only indifferently in touch with labor conditions at the mines. The Glace Bay management satisfies the union, but the union officials declare that the Sydney Mines management is less sympathetic. They claim that in this respect Glace Bay and Sydney Mines have in recent years changed roles. It is likely that the Royal Commission, now in session, will iron out all difficulties without a strike. It seems likely that a compromise will be effected before the month of cool-headed consideration has passed, thus making it legally permissible, though not patriotic and advisable, for the miners to call a strike.

May Do Clerical Work But Not Labor

The abortive attempt of the Lehigh Coal and Navigation Co. to introduce women around its mining plants was described in last week's issue. Other details have since come to hand. It appears that there were 42 girls and women, practically all foreigners, who undertook to perform these services for the company. The conservatism of the mine workers, however, was too great to withstand the shock.

It was not lack of patriotism, though it might well have that appearance. The need for more help in the anthracite region is so acute that any attempt to prevent the furnishing of that labor is saved from the aspersion of disloyalism only by showing that the purpose of disloyalty is lacking.

The employees of the Navigation Company can prove the sincerity of their patriotism by pointing to the large proportion of their numbers that purchased Liberty Bonds whenever they were offered.

	Loan	Percentage of Employees Subscribing	Total Employees' Subscriptions	Average Subscriptions
First	54.9	\$259,350	\$63.18
Second	50.9	222,250	58.50
Third	99.8	562,250	70.00

The reader will note that only two men in every 1000 failed to respond to appeals to buy the third issue of Liberty Bonds, and that the mine workers subscribed an average of \$70 per man, which is indeed almost one-third of the average subscription of all the purchasers of the Third Liberty Bond issue throughout the country.

STATE LAW SUPPORTS DEMAND OF LABOR LEADERS

But to return to the bloomer girls, the United Mine Workers gradually concluded that they would not permit the girls to be employed. They declared that, unless the female labor was dispensed with, all the collieries of the Panther Creek region would go on strike.

But patriotism prevented the mine workers from striking as they threatened. They appealed to the Pennsylvania Department of Mines, and on May 1 Seward E. Button issued the following letter:

"Undoubtedly the great drain that has been made upon the mining communities by employment other than mining has deprived the operators of a great deal of the labor necessary to operate their mines to full capacity, but the Department of Mines, impressed with the duty of upholding the mine laws, cannot, without authority, allow any exceptions, and the provisions of the law that prohibit the employment of females about the mines except in clerical work will be strictly enforced."

The following letter has been sent each inspector in the 25 anthracite districts:

"It having come to the notice of the Department of Mines that girls and women were being employed at some of the mines in the anthracite region, the inspector of the district in which the violation of the law occurred has been notified to stop the practice immediately. Under the provisions of the anthracite law, females cannot be employed in or about the mines except at clerical work, and you are hereby advised to see that no violation of this provision is permitted in your district."

Arrest of Disloyal Labor Agitators

Increased activity of Government agents in the Illinois coal fields is resulting in the arrest, here and there, of agitators who appear to be actuated by disloyal motives. Jacob Crawley, 39 years old, a miner who has been working for several weeks at Ziegler, Ill., was arrested a few days ago on information that he had made persistent attempts to induce the 400 men working in the Ziegler mine to go on strike. It is said that Crawley posed as a Secret Service agent, and told the miners that he had been sent to Ziegler to help them get just what they wanted.

Ziegler is only a few miles from Christopher, where the Government agents last week told the miners they could either go to work or face prosecution for a conspiracy to reduce the fuel supply. The men at Christopher decided that they would go to work. McCawley Baird, of East St. Louis, who is assistant to the United States District Attorney, says that if the men at Ziegler quit work at the behest of disloyal agitators, they will be given the same alternative.

Leopold Schwagling, 35 years old, employed at the Kolb mine No. 2, at Mascoutah, Ill., was arrested as a pro-German by a Federal officer because he objected to saluting each morning the flag erected over the tippie. By the demand of the miners flags are displayed at all the mines in that section, and the men are required to salute them.

GREGORY DENOUNCES MURDER OF ROBERT PRAGER

Referring to the lynching of R. P. Prager at Collinsville, Ill., Attorney General Gregory, in an address to the executive committee of the American Bar Association, May 6, said: "We must set our faces against lawlessness within our own borders. Whatever we may say about the causes for our entering this war, we know that one of the principal reasons was the lawlessness of the German nation—what they have done in Belgium, and in northern France, and what we have reason to know they would do elsewhere.

"For us to tolerate lynching is to do the same thing that we are condemning in the Germans. Lynch law is the most cowardly of crimes. Invariably the victim is unarmed, while the men who lynch are armed and large in numbers. It is a deplorable thing under any circumstances, but at this time above all others it creates an extremely dangerous condition. I invite your help in meeting it.

"From all the facts I have been able to gather concerning the lynching of Robert Prager in Illinois, I doubt his having been guilty of any offence. Such happenings grow out of a condition of mind where people say 'the Government is giving us no protection; spies are blowing up our factories; they are giving information to Germany; our boys are being shot in the rear, and our duly constituted authorities are doing nothing to protect us and we will take the law into our own hands.'

"This appeals to the excited and drunken mind. Unless stopped, it is going to result in a condition most deplorable."

After saying that "unless the hysteria which results in the lynching of men is checked it will create a condition of lawlessness from which we will suffer for a hundred years," he added:

"There is another potent reason for sternly repressing these disorders. The cry of the mob is that it is protecting the boys at the front. The reverse is true. No greater wrong can be done to our soldiers in France than that of lynching Germans in America. The story of the death of that German in Illinois is being considered in Germany

to-day. Such acts will be seized upon by our enemies as justifying severe reprisals on our soldiers in German prison camps. Having sowed the wind, we will reap the whirlwind."

Our Patriotic Mine Workers

From all over the country come reports regarding the Liberty Loan. In another column we have drawn attention to the fact that the Lehigh Coal and Navigation Co. sold the loan to 99.8 per cent. of its employees. The average subscription was \$70 per employee, perhaps the largest in the country. A pamphlet issued by the Lehigh Valley Coal Co. records the fact that this corporation, which sold nearly a million dollars worth of bonds, has not a single slacker in its ranks and that the average subscription was \$57.01.

The Clearfield Bituminous Coal Corporation reports that though its men bought heavily of the first and second issues of bonds, they were all ready to do their part when the third issue was opened for subscription. As a result the Grassflat district in Clearfield County bought \$21,400 worth, the Barnesboro district in Cambria County \$7150, the Clymer district in Indiana County \$17,000, the Rossiter district in the same county \$47,400, and the Clearfield office \$3250, a total of \$96,200.

CLEARFIELD BITUMINOUS COAL CO. DID WELL

This result was obtained by strenuous work on the part of the superintendents of the mines and by the coöperation of the management with the committees in the several counties and districts. The fact that a large percentage of these men are foreign born and many of them unnaturalized, proves conclusively that all of them are loyal Americans irrespective of nationality.

So much from what we are told by A. J. Musser, the purchasing agent of the company. From records which may not be wholly correct, we learn that the Clearfield Bituminous Coal Corporation has about 2000 employees. Its record therefore will compare not unfavorably with the two anthracite companies just referred to, though the figure per employee is somewhat lower and the percentage of subscribers less than 100.

Robert F. Roth, chief engineer of the E. E. White Coal Co., of Glen White, W. Va., informs us that the "patriotism speedometer" in that village registered \$1000 per min. for 50 min. on Friday, May 19. This \$50,000 subscription represents the bonds taken by the mine employees separate from those purchased by the company. Mr. Roth rates it as \$60,000 per million tons of coal produced, and estimates that \$38,000,000 would be subscribed by the mine workers of the United States if they all did as well as the mine workers at the E. E. White mines.

MEANTIME OHIO HAD WAR SAVING STAMP DRIVE

Ohio seems to have taken up more readily with thrift stamps. Three mines in Belmont County have bought \$30,000 worth of these stamps, three locals in Athens County purchased stamps to the value of \$50,000, and three in Perry County bought stamps of an equal gross valuation.

Under an Amsterdam, Jefferson County, Ohio, date line we are informed that a two-day drive was made for thrift stamps in the middle of April, and \$48,000 was subscribed by the miners of the vicinity. Two men were appointed at each mine, the companies paying them for their time and trouble. The subscriptions were taken at every man's working place.

The stamps were subscribed for at the current price of \$4.15. Each pay day a stamp will be placed in the pay envelope by the company, and \$4.15 deducted from the pay. This rate will be maintained until the amount subscribed is paid. The subscriptions ran from \$50 to \$500. The employees of the Wolf Run Coal Co. agreed to buy \$21,000 worth, those of the Youghiogheny and Ohio Coal Co. contracted to purchase stamps to the value of \$16,000, while the men of the Ohio & Pennsylvania Coal Co. undertake to accept in wage payment stamps worth \$11,000. The mines are small, and 85 per cent. of the mine workers are foreigners; but the record shows that they do not lack for patriotism.

Less Coal but More Wheat and Cotton

In Oklahoma mine workers are deserting the mines by the hundreds to take up work on the farms. The irregular operation of the mines is given as the reason. Under the zoning system the operators say they are not receiving enough orders to keep the mines running at anything like capacity, and the men, anticipating that work will be even more uncertain as the summer advances, are disposed to turn to the farms, where wages are high and work is steady. Operators are dissatisfied with the zoning system, or at least with the manner in which it has been applied to the Oklahoma mines. They say that most of the people ignore the buy-early appeals and that, for this reason, it is necessary to expand the field of transportation and sale for the Oklahoma mines if they are to be kept producing during the summer.

Commission To Settle Sydney Trouble

Employees in Canada under the Lemieux act are forbidden to strike until a period for conciliation has passed. The Lemieux act resembles the much-discussed Bryan treaties in regard to the making of war, only its application is to labor disputes alone, and the period of delay is a month only and not a year. Lengthy reference to the law was made in *Coal Age*, Apr. 14, 1917, pp. 670 and 671.

The Lemieux act is working badly around the coal mines of Canada. If one may not strike, surely one may take a holiday—and there is nothing to prevent that holiday being unduly protracted. But you can do most anything these days so long as you declare your motives are good.

WANT HIGHER WAGE AND UNION RECOGNITION

The Nova Scotia Steel and Coal Co. has been having trouble with its men who desire more wages and recognition of the union. The men, at first, were disposed to delay their strike to accord with the law, but the ferment ultimately became so general that a "holiday" was declared at four of the collieries Apr. 26. This holiday lasted till Apr. 29.

On that day the Royal Commission arrived to consider the complaints of the employees and the defense of the company. It is composed of Judge Chisholm, of the Supreme Court of Nova Scotia, chairman; Rev. Dr. John Forrest, of Pine Hill College, Halifax, and J. B. McLachlan, secretary-treasurer of the Amalgamated Mine Workers' Union.

The president of the union, Silby Barrett, is taking no active part in the discussions though he has recently returned from Newfoundland. McLachlan and Robert Baxter, the vice president of the union, have been conferring with General Manager Adams with the view to obtaining an amicable adjustment.

It must be understood that the iron, steel and tinplate workers are interested in the work of the commission as they have been threatening a strike. They have, of course, their own union—the Amalgamated Association of Iron, Steel and Tin Workers.

SAY THAT COMPANY STORE MAKES THEM INFRUGAL

The mine workers of Nova Scotia are endeavoring to obtain an amendment to the coal mines regulation act that will make it illegal after Oct. 1 for any corporation, like the Dominion Coal Co., to stop the wages of their employees for the payment of store bills. The Dominion Coal Co. may have to close its chain of stores. In any event it will be hampered in merchandizing, for it will no longer enjoy its immunity from bad debts which is the bane of the independent merchant.

The miners argue that the restriction of the credit system which will follow will make the miner more frugal. With his crutch broken they expect he will stand erect as a man should. But some men need such crutches, though it is true that there are some who use them who could well lay them aside. To take the crutch from a feeble man is not an act of charity, but rather the reverse. A man newly engaged often needs the assistance of the company store.

Shorten Working Day in Canada

The miners and other underground mine workers in British Columbia have already established the 8-hour day, but this provision has hitherto not applied to mine workers on the surface. Now the government of British Columbia has introduced a bill not only providing for the 8-hour day for outside workers around the mines, but providing that the 8-hour day for all surface workers shall be reckoned from "bank to bank."

The amendment to the Metalliferous Metals Inspection Act granting these reductions in hours runs as follows:

"No person shall be employed underground in any metalliferous mine for a longer period than eight hours in any twenty-four hours; and in computing the said period of eight hours the same shall be reckoned from the time the person enters the mine until he reaches the surface. No person shall be employed above ground at or about a metalliferous mine for a longer period than eight hours in any twenty-four hours; provided that nothing in this rule contained shall apply to persons employed in the office, boarding-house or bunkhouse of any mine."

Hon. Wm. Sloan, minister of mines, argues that failure to meet the men in this respect has kept alive friction between employer and employee, and that the establishment of the principle of an eight-hour working day for the coal miner, below or above the surface, will have a salutary effect. It is his opinion that under such a working arrangement the men will be more satisfied and there will be less reason for industrial trouble. In this connection he points to the strikes in British Columbia in 1917 at Fernie, B. C., where the coal mines were closed down for several months; to Rossland, B. C., where a lockout was declared by the Canadian Consolidated Mining & Smelting Co. when the men threatened to strike; and to a strike at the Trail, B. C., smelter, where work was stopped for several months in an effort by the men to obtain an eight-hour day, as illustrations of how industry may be interfered with, and production diminished, through a spirit of discontent and dissatisfaction among the workers. The mineral output of British Columbia in 1916 was \$42,290,462 and in 1917 it dropped to \$37,182,570, the difference being attributable to these disturbances. It is the Minister's hope that with their grievances settled the present year will be free of such trouble and the product of the province will jump back to the 1916 mark and, possibly, climb to the 50,000,000 figure.

The coal mine operators of British Columbia are not in favor of the contemplated legislation. They have lodged their protest with the Minister of Mines. Their argument is that shorter hours will mean less production at a time when, because of the demands of the war, greater production is essential. They say in effect: "We do not object to the principle of this legislation but we think it is inopportune." In discussing the matter with the Minister they suggested that the proposed law might be deferred to six months or a year after the end of the war. In this connection reference was made to last year's large exportations of coal from the United States to Canada. The United States thus met the Canadian shortage at serious disadvantage to herself, for coal was much needed in the United States. While this was done last year to meet an unexpected emergency, no one expects the United States will do the like again. The Dominion government, consequently, is expecting western coal miners to supply the necessary coal.

THIS country has drafted its young men for the greatest sacrifice that a man can make. Is there any logical reason why all able-bodied males should not be compelled to do at least eight hours work every working day until this war ceases, for which they will be paid far beyond what the man who makes the greatest sacrifice is paid? The enemy recognizes no restrictions of labor or time, so that the least that those of us who are at home can do is to stay on the job and put our hearts into it.—George S. Rice to American Institute of Mining Engineers.

DISCUSSION BY READERS

Practice in Mines in England

Letter No. 1—In reading the letter of Richard Bowen, *Coal Age*, April, 6, p. 644, I could not help but feel that what he believes is true in regard to the practice in English coal mines, he would find to be directly opposite to what is actually the case in those mines. I am certain that such is the fact in the County of Durham where I belong.

Allow me to state, for Mr. Bowen's information, that the mine officials, in the County of Durham, England, have *all* to say in regard to the safety of men, the enforcement of the mining laws and securing discipline in the mines. Their authority, in this respect, is greater than that of most of the mine officials in this country. The Miners' Union does not, as he states, "control everything pertaining to wages, safety of men, mine laws, etc.," and, in my opinion, the mines there are kept up-to-date.

If Mr. Bowen has never worked in the coal mines of the County of Durham, it would do him much good to take a trip across and visit some of those mines. He would soon see that the firebosses employed there, as well as the assistant mine foreman, have a good deal to say about the way affairs are run inside of the mine. Each of these officials is at the head, in his own district; and not, as Mr. Bowen says, "tagging on the tail."

Referring to the statement that "if a man starts in as fireboss he is apt to continue in the same position," let me say that when that is the case it is the man's own fault. Every honest worker has a good chance of promotion if he will study the science and art of mining and take the examination for mine manager.

Every man that wants to study is afforded plenty of chances to do so, as there is a night school held twice a week in every mining town. There are, besides, classes of mining that meet twice a week, which are attended by the men. I can say, with Mr. Bowen, that my motto is, "keep things moving and up to date," as I have been taught this from boyhood by the officials in the coal mines of England. ROBERT LAVERICK,
Seward, Penn. Mine Foreman.

Electrically Driven Mine Pump

Letter No. 3—In addition to the suggestions made in the letter of W. H. Noone, *Coal Age*, Mar. 23, p. 559, kindly permit me to offer a few comments in regard to the possible cause of the trouble experienced in the operation of the electrically driven mine pump to which reference has been made.

While I am not acquainted with the particular type of control of this pump, it occurs to me that the seat of the trouble may lie in the lack of proper adjustment; and I would suggest the following in the hope that it may serve to correct the trouble. My suggestion is based on the supposition that the controller may not

have sufficient starting resistance to allow the motor to accelerate uniformly from zero to a speed corresponding to that when running under full load.

When using a manual controller I would suggest that the operator take a longer time to move the controller lever from the *off* to the full running position, allowing sufficient time on each notch of the controller for the motor to accelerate properly.

When using a dashpot-accelerated controller, or one accelerating the motor in accordance with the constant current method of acceleration, the dashpot should be adjusted to give a longer accelerating period. In the case of an air dashpot, the adjustment is made by means of an adjusting screw, or, in the case of an oil dashpot, a like adjustment may be made by using a little heavier grade of oil.

When using a controller acting on the constant-current method of acceleration, if the series relays or magnetic lockout switches have been adjusted to give the longest interval between the closure of each switch the accelerating period may be further increased by allowing a longer interval of time between the closure of the main switch and the first resistance switch, which will make the remainder of the resistance switches close somewhat faster than in the previous adjustment.

In closing, permit me to say that I feel that one of the suggestions mentioned here will undoubtedly cover the type of control on the pump in question. Motor control for pumps is described in Booklet "P" of the Cutler-Hammer Manufacturing Co., which will be gladly sent to any address on request.

R. J. MAUJER,
Pittsburgh, Penn. The Cutler-Hammer Mfg. Co.

Miners and the War

Letter No. 10.—It would seem, from the number of excellent letters that have been written on this subject, that the miner would be aroused to a feeling of his personal responsibility in regard to the prosecution of the war. As time goes on, it appears more and more important that some effective method be used to stir up the miner and interest him in the part he must play in the defense of the country.

If America is to develop a fighting machine that can successfully combat that of Germany, everyone must feel the earnestness and purpose of the undertaking. Every miner must be vitally interested in the production of coal, as this is the factor that underlies all munitions of war. We talk of "democracy"; but what does it mean when we fail to realize and assume our share in the great cause?

Let me suggest that mine officials must not cease to impress on their men the cold facts of the war as they are made known to us from day to day. There is no danger of exaggeration, for the truth is more

hideous and strange than fiction. We cannot afford to be skeptical in regard to the terrifying war policy of Germany when we reflect on the quick manner in which Belgium and Northern France were invaded. All that has been printed and told regarding the atrocities committed, the wholesale indiscriminate slaughter of women and children, is true and many of their foul deeds cannot be published without violating common decency.

The fact of the matter is that not alone the miners but all of us are unwilling to believe the half we are told of the war aims of Germany. The truth seems inconceivable but makes it all the more important that we should be informed and willing to tell others of the overbearing policy that Germany has pursued for years, dating back to the "mailed fist" of Bismarck. One thing is certain and that is, if Germany is successful at this time, Great Britain and America will not escape the fate of Belgium and France.

The production of coal, which is the miner's task, is not the only requirement of the Government, but it is fundamental. We need every pound of coal that can be put out of the mines to manufacture the necessary munitions of war—guns, ships, ammunitions, food and clothing for the soldiers and sailors. Every energy must be employed in the effort to produce what is necessary for our success in the war. I feel certain that if everyone fully understood the war aims of Germany there would be no slackers in this country, except the pro-German element. Let us do our part.

Thomas, W. Va.

W. H. NOONE.

Women in Industry

Letter No. 3.—If not too late, I would like to add a few words endorsing some of the sentiments expressed in a letter that appeared in *Coal Age* some time since [Jan. 12, p. 70].

If my memory serves me correctly, the writer of that letter was opposed to the employment of women to take the place of men in coal mining and other industries, at the present time. In my opinion, women should not be employed, in most of our industries, until all available male help is exhausted. Their employment in the mines is particularly objectionable.

We are approaching a time when there will be a large reduction in the manufacture of liquor. It is possible that this may cease altogether. In that event, there would be thousands of men thrown out of employment and available for use in other industries. The employment of women involves many difficulties. For the most part, special training would be required, and it is a question whether they would be physically able to perform much of the work now done by men. I do not doubt but that they would prove as skillful in the performance of any work of which they are capable.

Our women are now doing a great service to their country, in the different spheres in which they are interested, chiefly the Red-Cross work of furnishing many necessities for the war, and serving as trained nurses in hospitals and at the front. I believe, also, that women are better adapted to work along agricultural lines and perform light service in mills of a certain class. The women of England and France have proved this beyond a doubt.

I recall, further, the suggestion that boys, under the age of 16, who are now debarred, by law, from working in mines would be able to do good service if the law was to be set aside during the war. These boys could be placed in charge of experienced miners, a boy with a man, and their employment would go far toward expediting the work underground.

Most of the boys not only speak their mother tongue but talk English as well, having been taught the English language in the schools. In this respect, they would be of great assistance to their older fathers and brothers, who so frequently fail to understand the instructions given them by the foreman and his assistants.

In a short time, the boys would be able to fill the places of those who have reached the draft age and been summoned to the front. I believe that this subject has an important bearing on the future welfare of coal mining.

R. W. LIGHTBURN.

West Leisenring, Penn.

Storage-Battery Locomotives

Letter No. 3.—Since the publication of a number of articles in *Coal Age*, a year or more ago, drawing attention to the peculiar adaptation of the type of locomotive known as the "storage-battery" machine, little has appeared in print regarding its performance in the mine. It was, therefore, with pleasure that I read the letter of "Engineer," in the issue Mar. 16, p. 513.

In the hope of learning the results that have attended the use of this type of locomotive in the mine, kindly let me ask that some of those who have been operating these machines submit their opinions in reference to their capability to perform the work required underground. My own opinion has been that the storage-battery machine is destined to become a very dominant factor in the production of coal within the next three or four years. I have been anxiously awaiting to hear from others along this line.

There are many coal companies, among them one of the largest companies in the Pittsburgh district, that have employed a great number of these machines in their mines, for a long time. There can hardly be a doubt but that some of these companies could furnish some very interesting figures regarding the cost of maintenance of such machines and the advantages realized through their use in the gathering service, at the working face in the mine.

DUTY OF PASSING INFORMATION ALONG

It may not be out of place for me to suggest that, in these times of stress and worry, it behooves every member of the coal-mining industry to pass along all the information he may have regarding the latest types of modern mine equipment. The storage-battery locomotive belongs to this class, and its performance in the mines where it has been in use should be made known to those who, as yet, are unacquainted with its peculiar advantages.

It is my belief that the economies realized in the use of this machine must be very great, in comparison with the old mule that has been and is still so largely employed in gathering cars at the face. There must be, also, a great saving over the employment of the type of machine known as the "cable-and-reel" motor. Such

being the case, interested readers of *Coal Age* will be glad to learn these facts first-hand.

The present is no time to hoard knowledge that will advance the common interests of the coal-mining industry, inasmuch as these interests are or should be subordinate to the greater interests of the country. Let us hope that there will be a generous response along this line, not only relating to the particular type of machine that I have mentioned, but all mining equipment possessing peculiar advantages in the production of coal, which is the country's great need today. ANXIOUS.

New York City.

Observation of Sun for Latitude

Letter No. 1—Referring to the article describing the Ross meridiograph for assisting the quick determination of a true meridian, *Coal Age*, Apr. 20, p. 732, kindly permits me to offer a few comments on a misstatement made in the article, with reference to finding the latitude of a place by observation of the sun at noon, which I was glad to see was quickly caught and corrected in the following issue, Apr. 27, p. 790.

The statement to which I refer occurs at the close of the second paragraph, second column, page 732, which reads, "The altitude of the sun at noon is always the co-latitude of the place." Also, at the top of the third column, on the following page, it is stated, "The latitude is the angular distance of the sun at noon from the zenith."

Of course, this condition can only obtain twice during the year; namely, when the sun is crossing the equator,

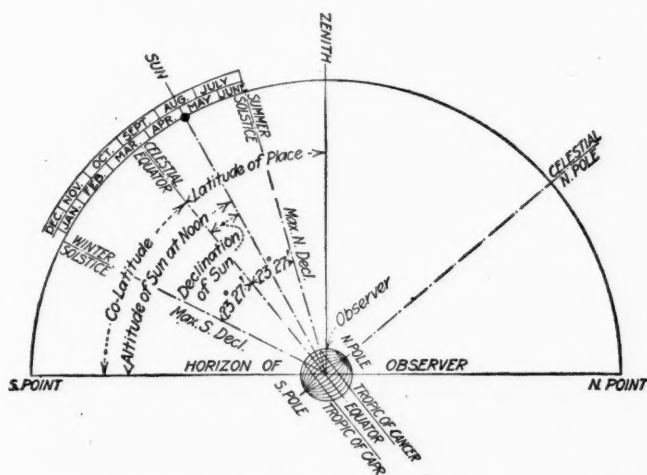


DIAGRAM ILLUSTRATING OBSERVATION OF SUN FOR LATITUDE

in March or September, and the declination is, consequently, zero. At all other times, it is necessary to subtract a north declination from, or add a south declination to, the observed altitude of the sun at noon, when the observer is in north latitude. In like manner, if the observer is in a south latitude, it is necessary to subtract a south declination or add a north declination to the observed altitude of the sun.

In other words, when the observer and the sun are both on the same side of the equator the declination must be subtracted from the observed sun's altitude, but if the observer and the sun are on the opposite sides of the equator the declination must be added to the

observed altitude. The result will be the co-latitude of the place, which must be subtracted from 90 deg. to obtain the latitude.

As will appear from a study of the accompanying diagram, the latitude of a place is always the angular distance of the celestial equator from the zenith, while the co-latitude is the angle that the plane of the equator makes with the observer's horizon.

When observing the altitude of the sun at noon, for the purpose of determining the latitude of the place of observation, it is important to make the necessary correction for refraction of the sun's rays in passing through the earth's atmosphere. This correction will vary, ordinarily, from a fraction of a minute to 2 or 3 min., depending on the latitude of the observer and the declination of the sun at the time of observation. This correction must be subtracted from the sun's observed altitude.

Again, since an observation is rarely ever taken to the center of the sun, the disk of the orb being more frequently observed, allowance must be made for the semi-diameter of the sun; but, as the resulting parallax amounts to but a few seconds of arc it is usually ignored, in this observation.

HOWARD ECKFELDT,
Prof. Mining Engineering,
South Bethlehem, Penn. Lehigh University.

[We are glad to present this clear and succinct explanation of the determination of the latitude of a place, by observing the altitude of the sun at noon. The misstatement to which reference is made was a pure oversight that occurred in the hurried preparation of a difficult article for press, and observed too late for correction in that issue.—Editor.]

Sinking Shaft Through Quicksand

Letter No. 1—Having had some considerable experience in the sinking of shafts through any kind of material and in different localities, I was much interested in the inquiry of John A. Rury that appeared in *Coal Age*, Apr. 13, p. 712, and in the reply given by the editor, explaining numerous expedients to be adopted in such cases.

From the reading of the inquiry, it may be assumed that the proposition presented is attended with difficulties that will call for much experience on the part of those in charge of the sinking. Many instances have come under by observation where the attempt has been made by a company to sink a shaft through watery strata, without having the knowledge and experience that will insure success in such an undertaking.

Kindly allow me to suggest to Mr. Rury that it would be far cheaper, in the end, for him to employ an experienced shaft sinker and contract with him to sink the shaft to the required depth at a fixed price, which should be such as to afford the contractor a reasonable profit in doing the work.

My experience is that freezing is an exceedingly expensive process to apply in the sinking of shafts, because of the trouble that is liable to occur later when the frozen strata has had time to thaw out. When the excavation has passed through the strata and it is no longer necessary to maintain the freezing process, there

will frequently be some trouble experienced through water flowing into the shaft, and if proper provision has not been made to take care of this inflow disaster will certainly result.

It is worthy also of mention that, at the present price of cement and the possibility of getting no satisfactory results from its use, in an attempt to control the inflow of water into the excavation, grouting may prove a difficult and expensive undertaking. In every case, judgment and experience must decide on the measures to be adopted and which will prove most successful and require the least outlay in time and material.

For the reasons given I would advise Mr. Rury to consult some reliable engineering company or contractor who will engage to do the work after looking over the ground. In doing this he will relieve his company of the burden of possible failure, which burden is then assumed by the party contracting to do the work.

F. D. BUFFUM, Engineer,
The Rust Engineering Co.

Pittsburg, Penn.

Loading and Shipping Clean Coal

Letter No. 5—Most mining men have been forcibly impressed with the growing demand, within the last few months, calling for "coal—more coal." Whatever the experts may say in regard to the supply of coal being sufficient to meet the demands, provided the car situation was cleared up and the hundreds of coal cars now lying idle on the side tracks distributed to the mines, there is one thing that is of equal if not of greater importance to the coal industry. I refer, now, to the indifferent and careless manner in which many miners load their coal.

Our mine is located on the main line of one of the great railroad systems of the country and is an important coaling station for the road. During the early winter I was continually notified, by the railroad authorities, of the many complaints they had from their firemen in regard to the poor quality of the coal that they were compelled to use.

APPEAL TO PATRIOTISM OF MINERS AND AID OF THE UNION INVOKED

As a result of these complaints coming from the railroad, I was forced to adopt some means to make our men use more care in loading their coal. I appealed to their patriotic sense of duty, telling them that it was a duty that they owed to their country and urging them to do their utmost to bring our output up to a condition fit for the market.

This argument made little impression, however, and I was then compelled to adopt the expedient of laying men off a day for the first offense, two days for the second offense, and discharging any man guilty of a third offense. Finding, after a short time, that these measures produced little effect, as the men still continued to load dirty coal and take a chance of being punished for it, I decided to make a more direct appeal to the miners and again attempt to arouse their sense of patriotism in another way.

For that purpose, I addressed the following letter to the miners' local, which met during the week, and the men were all notified to attend the meeting, as a matter of importance was to be presented:

Gentlemen—Owing to the scarcity of cars and other equipment, the coal mines of this country are working less than half-time. The railroads are unable to supply sufficient cars to haul to market the coal that is needed. It is up to all of us to help out in the present crisis that has befallen our nation. Every miner can do his share by loading only clean coal. Where he must load rock it must not be mixed with his coal, and mine officials will discharge any man who will deliberately load dirty coal.

There are localities where a man has some excuse for failing to load clean coal, as when his working place is wet, the coal of an inferior quality and the roof bad. But any man, working in a place under normal conditions, who deliberately loads rock with his coal is unfair both to himself and his fellowmen and will be dealt with accordingly. Such a practice on the part of our miners will ruin the company who employ them, and eventually force the mine out of the market.

The practice of loading rock with the coal acts to keep the miners out of employment, in other parts of the country, because of increasing the scarcity of cars. Time is wasted in the needless hauling of rock instead of coal or other useful materials; neither can you raise steam with impure coal any more than you can cook food in the home with the same.

Complaints are coming too frequently to the office in regard to the failure to raise steam sufficiently on the railroads, because of the dirty coal we are sending them. Let me urge, therefore, that every one do his best to load only clean coal. No man should sell as the fruits of his own labor that which he would himself refuse to buy as being unfit for use. Your country calls on you to do your best. Respond to your country's needs by giving the best that is in you.

Since making this appeal, our company has had no further complaints from the railroad, and I can say, with pleasure, that the coal loaded by our men is now equal to the best in the market. GRIFFITH GRIFFITH.

Blackfield, Penn.

Letter No. 6—The numerous articles that have appeared recently in *Coal Age*, regarding the shipment of dirty or high-ash coal have almost unanimously laid the blame or, as the boys say, "passed the buck" to the miner. While there is, undoubtedly, much truth in this accusation there are other factors concerned in the production of an inferior quality of coal.

The nature of the seam and its infolding strata has probably more to do with the quality of the coal mined than the greediness or the carelessness of the miner. As is well known, some coal seams contain dirt bands or are overlaid with a frail roof that makes the cleaning of the coal, in the mine, difficult. Again, some coals contain inherent ash, which is explained by geologists who say that the high-ash content of the coal may be due to the precipitation of colloids by alkaline waters and the deposition of silica in the organic mass of the coal.

THE MINER NOT ALWAYS TO BLAME

It is obviously unfair to blame the miner when he is compelled to work a seam of coal that cannot be expected to yield a fair quality of coal. It frequently happens that a company will open and operate such a seam of coal simply because it lies close to a railroad. It is

unfortunate that there were many such coal tracts available, at the time when the present boom matured.

Many inferior coals appear to the eye much as a low-ash coal of good quality, and the unwary or irresponsible operator has not hesitated to undertake the mining and marketing of such coals, taking advantage of the unprecedented demand. It is my belief that conditions such as these I have mentioned are largely responsible for the inferior quality of coal sent to market.

While there are many good coal properties available, the would-be operator has invariably chosen to invest his small capital in coal lands affording easy shipping facilities. He is deceived in the belief that the nearby coal will bring the same price in the market and will require a smaller invested capital than better grade coals that are more isolated.

Under the present existing conditions, high-ash coals will be marketed as long as men can be found that will buy and use them in their plants. Until such inferior coals are refused on the market, the better-grade coals that are less available and require a bigger investment, in mining, will not be worked by a large class of operators who have not the capital to justify the undertaking.

Besides the factors that I have mentioned, the thickness of the coal seam is an important development in determining the cost of mining. A thin seam requires the handling of a large amount of waste material. It frequently happens, however, that these thin seams contain the purest coal, while seams of greater thickness are intimately mixed with bands of fireclay, slate and bone that, in many cases, are practically impossible to separate completely from the coal. Bony coal often so closely resembles coal of good quality, that a sharp scrutiny, in broad daylight, is necessary to distinguish between the two grades, and it is practically impossible to make the separation in the dim light of the mine.

J. W. KNOWLTON,

Chief of Testing Department,
West Virginia Coal & Coke Co.

Elkins, W. Va.

Air Compressor in a Gassy Mine

Letter No. 1—The proposition presented by "Inquirer," *Coal Age*, Apr. 20, p. 759, interested me, and I am led to offer the following suggestion, as the result of my own experience in the use of coal cutters:

The question uppermost in my mind is, What is the advantage that led to the installation of the coal punchers driven by compressed air, in this mine. There are, undoubtedly, conditions under which those machines can be used with some advantage. However, I have found that where a mine is equipped with electrical power, and conditions in the seam will permit of the use of chain coal cutters, these are the machines to be employed.

My suggestion is that, by all means, use the electric chain coal cutters whenever and wherever possible. I have used the Sullivan "Ironclad" continuous cutting mining machines, for some time, and have found them most efficient in room-and-pillar workings.

One point worthy of mention is the greater cutting capacity of the chain machines over that of the puncher type. The former I have found equally as flexible as the latter and easy to handle. I do not hesitate to recom-

mend them for use wherever the conditions will permit.

In closing, permit me to say that I have not experienced the difficulty this correspondent mentions, in securing the delivery of recent orders, although it may be possible that war conditions have lately aggravated the situation and delayed deliveries.

ANON.

—, W. Va.

Letter No. 2—Referring to the inquiry, *Coal Age*, Apr. 20, p. 759, from a correspondent in Kentucky, regarding the installation of an air compressor in the return airway of a gassy mine, for the purpose of furnishing power to several coal punchers, let me say that I agree with the conclusion of the editor that the compressor should be installed on the intake air.

In Pennsylvania, the mining law requires that an electric motor must be flame-proof if placed in a mine, or it must be located in a room ventilated separately with intake air, in order to avoid the possibility of an explosion from the sparking of the brushes or other connections. I mention this inasmuch as the correspondent contemplates the use of electric cutters.

POSSIBLE EXPLOSION IN COMPRESSOR CYLINDER

Permit me to say that the editor's suggestion that there is a possibility of explosion taking place in the compressor cylinder, should the compressor be located on the return air, does not appeal to me as worthy of consideration. In my opinion, the compressor cylinder never gets so hot as to ignite gas-laden air compressed by the machine.

Regarding the second question asked in reference to how the location of the compressor on the intake air would affect the ventilation of the working places, I agree fully with the editor when he says that this "would not interfere with the ventilation of the working places, because the air compressed would again be released at the working face, after operating the drills." In this connection, it should be remembered that in driving tunnels and subways, the excavation is often wholly ventilated by the exhaust air from the drills.

The correspondent's idea of locating the compressor at a point nearer the working face is a good one, as it will release a great length of pipe, which can then be used for other purposes, and at the same time avoid the losses in the pipe line by leakage and friction, in transmitting the air so great a distance.

Johnstown, Penn.

FRED W. SAKON.

[The reference to the danger of a possible explosion taking place in the compressor cylinder as being hardly "worthy of consideration" does not take into account the fact that, in the use of single-cylinder compressors, explosions are not infrequent, even when the compressor is working on pure air. This is generally attributed to the flashing of the mineral oil used to lubricate the cylinder. In compressing air to five or six atmospheres, at sea level, the heat of compression in the cylinder may rise to between 400 and 500 deg. F., which is much above the flashing point of many mineral lubricants. Should the flashing of the oil occur, it can readily be imagined what would result when the compressor is working on air charged with gas and dust.—Editor.]

INQUIRIES OF GENERAL INTEREST

Gas Encountered Reopening Mine

We have been engaged recently in the reopening of an abandoned mine that gives off some firedamp. The seam is flat and is reached by a slope opening driven from the surface to the coal. Water had accumulated in such quantities that the workings were full to the roof. Since there was but one opening to the old mine, we at once started a second slope about 1 mi. from the mouth of the old slope and at a lower point.

We started to pump out the water from the old slope, but found much gas traveling up the slope. The gas gave a cap 4 in. high, on the Wolf lamp, but would not explode, although the flame in the lamp twisted about in a queer manner, as though it would explode. We even attempted to explode this gas by the use of black powder but failed.

As the water lowered in the mine I was able to penetrate about a half-mile into the workings, but could get no further owing to the blackdamp. A peculiar feature that I observed was that the flame cap decreased in height the further I went in the mine. The lamp, however, showed a cap up to the point where I was forced to turn back for lack of air.

I observed, also, that for a distance of about 350 ft. from the mouth of the slope, fresh air was flowing into the mine along the bottom, while mixed air and gases were traveling out of the mine, at the roof. The two currents, the one flowing in and the other out of the mine, were divided by an imaginary line near the center of the airway. Further down the slope, I failed to detect any movement of the air, while, as I have said, the flame cap on the lamp grew constantly shorter as I proceeded.

Water accumulated very rapidly in the second slope, it being at a much lower level. We are now pumping from that slope, which is full almost to the mouth. I have had considerable experience with "lazy gas," before, but never found gas that would give a cap on the lamp and yet would not explode. Any information that *Coal Age* can give me on this point will be much appreciated.

Adamsville, Ala.

J. M. KEMP.

In several instances, we have referred in *Coal Age* to conditions that frequently occur in coal mines, favoring the production of what is termed "flashdamp." This is a mixture of methane and carbon dioxide, formed under conditions that permit these two gases to diffuse into each other in the absence of air. Pure flashdamp containing no air, as explained on page 127, "*Mine Gases and Explosions*"—Beard, consists of a mixture of 812 vol. of carbon dioxide to 1344 vol. of methane, since the gases mix in the inverse ratio of the square roots of their densities.

Practically, pure flashdamp contains about 8 vol. of carbon dioxide to 13 vol. of methane; but this ratio will

vary according to the admixture of air, while the diffusion is taking place. Under conditions where sufficient air is present, the mixture may be even explosive; but flashdamp containing little or no air will not explode, owing to the presence of so large a proportion of carbon dioxide, which is extinctive of flame.

It should be remembered, here, that a body of fire-damp, at its most explosive point, being 1 volume of methane to 9½ volumes of air, is rendered in explosive by the addition of one-seventh of its volume of carbon dioxide ("*Mine Gases and Explosions*," page 104). But, a much larger proportion of carbon dioxide is present in flashdamp, which makes the mixture in explosive.

Again, under conditions where a body of more or less pure flashdamp is found accumulated in a pocket in the roof of a chamber and there is pure air below, a safety lamp raised into the mixture will show plainly a cap on the lamp flame, which is quickly dimmed. The flame may even be extinguished by the gaseous mixture filling the combustion chamber of the lamp and displacing the fresh air from around the flame. The extinction of the lamp, however, will depend on the purity of the flashdamp or the proportion of air it contains. It is this momentary appearance of a cap on the lamp that has given the name "flashdamp" to this mixture.

The same explanation will apply to the changing character of the flame cap remarked by this correspondent, as he proceeded further into the mine. He reports a 4-in. cap appearing on the Wolf lamp, in the mine entrance, and gradually decreasing in height as he penetrated into the mine, until he could go no further and was obliged to withdraw, owing to the blackdamp, which filled the old workings to an increasingly dangerous extent.

The observed inflow of air along the bottom of the slope, for a distance of about 350 ft. from the mouth of the mine, and the outflow of the mixed air and gases along the roof of the passage is only natural. It is a matter of common observation that, under similar circumstances, the cooler outside air will continue to circulate along the floor of an airway and form a current quite distinct from the warmer air flowing at the roof.

This is frequently observed where rooms or chambers are driven to the rise or dip of an entry and the temperature at the faces of the breasts is a few degrees above or below that of the air circulating on the road. In every case, the lighter air will travel along the roof, while the heavier air follows the floor, the two currents being separate and distinct.

In some instances, the air at the roof will give a plainly observable cap, which disappears as the lamp is lowered. At other times, a lamp will be almost or completely extinguished by the air flowing at the bottom, while the light is not affected in the same manner nearer the roof. These facts have led to the conclusion that gas is often stratified in a mine airway; or, in other words, travels in veins.

EXAMINATION QUESTIONS

Bituminous (Penn.) First-Grade Examination, Apr. 11, 1918

(Selected Questions)

Ques.—What dangers are to be guarded against in the operation of mining machinery in gaseous mines, and what precautions would you enforce to lessen the same?

Ans.—Aside from the usual precautions taken to safeguard mining machinery of any kind, and which apply alike to gaseous and nongaseous mines, further danger arises from the operation of electrical mine equipment, because of the sparking of wires or brushes, the blowing out of fuses, or the breaking of incandescent lamps. Any of these occurrences may give rise to the ignition of accumulated gas or dust and result in a disastrous explosion.

In an electrically equipped gaseous mine, every precaution should be taken not only to avoid the occurrences just mentioned, but to prevent dangerous accumulations of gas and dust in all portions of the mine workings. The installation of electrical equipment of every kind should be in charge of a competent electrician who is thoroughly acquainted with the conditions that are liable to obtain in a gaseous mine.

Ques.—In a mine giving off 2200 cu.ft. of gas per min., the volume of air entering the intake opening is 4,200,000 cu.ft. per hour. What is the percentage of gas in the air current at the outlet? Would you consider this percentage of gas dangerous?

Ans.—The quantity of air entering the mine is $4,200,000 \div 60 = 70,000$ cu.ft. per min. Adding to this the volume of gas generated in the mine in the same time, gives a total current of 72,200 cu.ft. per min. passing out of the mine. The percentage of gas in this current is $2200 \times 100 \div 72,200 = 3.05$ per cent., nearly.

Ordinarily, this would be considered a dangerous percentage of gas to be found in the workings of a bituminous mine, and immediate steps should be taken to increase the volume of air in circulation, so as to lower the percentage of gas that it may not exceed 1 or 2 per cent., depending on the character of the coal, its inflammability and the fineness of the dust produced in the mining of the coal.

Ques.—On assuming charge, as a mine foreman, at a gaseous mine, what information would you consider it necessary to obtain in order to intelligently perform your duties?

Ans.—The mine foreman must have a thorough knowledge of the requirements of the mining law and be fully acquainted with the existing mine rules and regulations. He must understand the conditions that prevail in the mine, relating to the amount of gas generated in the different sections of the workings, character of the roof strata and the coal. He must study carefully the system of ventilation employed and the distribution of the air.

The mine foreman must examine in detail all ventilating equipment and appliances, including the fans and engines on the surface and the air stoppings, bridges, doors and brattices in the mines. He must investigate the work of the firebosses and know the duties each is expected to perform.

Having given these matters careful attention, he must instruct his assistant foremen in a manner that they will be able to carry out his plans intelligently, with a view to securing the greatest safety in the operation of the mine. They will be able, from their previous experience, to give the new foreman much information that will be valuable to him in gaining a knowledge of the practical conditions affecting the working of the mine.

Ques.—Describe what system of ventilation and general management you would adopt in a gaseous mine, in order to keep the mine in a safe condition.

Ans.—The choice between the blowing and exhaust systems of ventilation will depend on the character of the mine. In general, it can be said that the exhaust system is best adapted to the ventilation of a gaseous mine, because it permits of the haulage being performed on the intake airway, without necessitating the use of doors at the shaft bottom, which would be required if the mine was ventilated on the blowing system. On the other hand, the blowing system of ventilation is generally preferred in a nongaseous mine, for the reason that the warm return air current passing on the main haulage road and ascending the hoisting shaft prevents the formation of ice in the winter time. In order to keep the mine in the safest possible condition, the air current should be split and each district of the mine ventilated by a separate current, the return from each district passing directly into the main return airway.

In regard to the management, where blasting is performed in the mine, only permissible explosives should be used and shotfirers should be employed to examine, charge and fire all shots after the men have left the mine. Competent firebosses should examine every portion of the mine before the men are permitted to enter for work in the morning.

Ques.—State what dangers, if any, may arise from the exclusive use of electric safety lamps in a mine.

Ans.—Although the exclusive use of mine electric lamps is rapidly growing in favor, it is generally acknowledged that there are two sources of danger to be guarded against in their use: (1) The possible ignition of gas or dust by the accidental breaking of the globe of an incandescent lamp, or the sparking of electrical connections. (2) The danger of workmen being overcome by gas, the presence of which is not made known by the electric mine lamp. With proper care and precaution, however, these dangers are not generally considered as detrimental to the use of electric mine lamps, which have special advantages that render their adoption in mines as being highly desirable.



High Lights in the Fuel Situation as Seen by the "Coal Age" Cartoonist

COAL AND COKE NEWS

What Happened in April

The figures in brackets in the text refer to pages in the present volume, reference to which will give fuller information regarding the matters discussed in the item to which the bracketed figures are attached.

- Apr. 1—United States Fuel Administration zoning order comes into operation [547]—Orenda Smokeless Coal Co. purchases the Orenda mine from the Merchants Coal Corporation with 1700 acres of coal land [648]—State of Indiana goes "bone dry."
- Apr. 2—New prices are made for coal from Raton, Gallup, Carthage, Cerillos, Sugarite and Monero districts in New Mexico [632].
- Apr. 3—Prices made by the local fuel administration in Wyoming for the Wyoming sub-bituminous coal mines are confirmed by the Federal jurisdiction [698]—New prices are made for parts of the States of Kentucky, Tennessee, Virginia, Iowa and all of Georgia [698]—Senate passes the Third Liberty Loan bill.
- Apr. 4—Use of domestic sizes of anthracite for steam-raising purposes condemned by the United States Fuel Administration [698]—Price of coke raised 5 per cent. when manufactured east of the Mississippi River and sold west of the Rocky Mountains [698]—Fuel Administration orders that the term "foundry coke" shall cover only coke selected for foundry use according to the usual trade practice—New prices are made for Black Creek, Brookwood and Blue Creek cokes of Alabama and for beehive-oven coke produced in Fayette, Kanawha, Preston and Nicholas Counties in West Virginia, and for all kinds of coke produced in the State of Washington—Charles M. Means appointed manager of inspection division, United States Fuel Administration [699]—Judge Strauss, of Pennsylvania, rules, in the Joseph Zadwick case, that the corroboration of a second party is not needed to establish the right to workmen's compensation, when a workman dies as the result of a strain received in an isolated part of the mines [714].
- Apr. 5—R. P. Prager is lynched as an alien spy by mine workers at Collinsville, Ill., [704, 705 and 842]—Big strike commences in the Dombrowa coal fields of eastern Russia. It was still continuing May 3 according to advices from Zurich, Switzerland.
- Apr. 6—Central Pennsylvania mine workers decide to put off their threatened strike [704]—Third Liberty Loan is offered for sale.
- Apr. 9—Wagon mines forbidden to add cost of hauling to Government price when coal is loaded in open-top cars except where coal is bought by a railroad for its own use—Strike commences at Lethbridge, Alta. [749]—Michigan-Ohio-Indiana Coal Association meets on this and day following at Cincinnati, Ohio [676 and 677]—President creates a National War Labor Board composed of the same members as composed the commission which advocated the formation of the board—Dr. Garfield demands that the price of coal paid by railroads shall be the price set by the Government as the fair and maximum price at the mines.
- Apr. 10—Fuel administrators from states east of Mississippi meet in Washington—Order of Administration requires that smokeless coal shall be delivered only to the bunkers of ships and specifies that contracts for smithing coal made before Feb. 14 will be abrogated if the coal delivered is found not to be a true smithing coal and if the coal is not used, or to be exclusively used, for smithing; other regulations are made in the same order [747].
- Apr. 11—Bottle manufacturers, not making food containers, agree to reduce their output 15 per cent.—The Government takes control of 63 coastwise vessels which added to the fleet owned by the railroads, which are also federally con-

trolled, makes 111 coastwise vessels under Government control, having a rated capacity of 400,000 tons.

Apr. 12—Explosion in the Shoal Creek mine, Panama, Ill., possibly caused by alien enemies [749].

Apr. 13—Zone system modified so as to forbid the Pennsylvania R.R. from delivering in Washington or Baltimore, coal produced on the Pennsylvania R.R., to Monongahela R.R. and the Huntington & Broad Top Mountain R.R., and their short line connections in Pennsylvania, West Virginia and Maryland [746]—The International Board of the United Mine Workers of America protests against the frequent changes in coal prices, declaring it a large cause of the irregular work at the mines [748]—House passes the Senate bill changing the basis for the second draft from population to the number of men listed in Class 1.

Apr. 16—Frank J. Hayes, president of the United Mine Workers of America, and other officers of the union organization confer with H. A. Garfield on the slackness of the mines alleged to result from price regulation—Strike commences in Georges Creek and Upper Potomac regions, laying 6000 men idle [748 and 796]—Wage increase of 50c per day granted by the Western Fuel Co., British Columbia, to some 1500 employees [749]—Senate and House adopt conference report on "Sabotage Bill," which prescribes imprisonment penalties for interfering with war industry; but the punishment provided for strikers is eliminated.

Apr. 17—United States Fuel Administration announces that the Tennessee Coal, Iron and Railroad Co. will submit to the conditions of the Peale contract in Alabama [842]—Strike in Georges Creek region comes to an end [748 and 796].

Apr. 18—New prices for Colorado coke, for the coke of Monongalia County, West Virginia, and for such 72-hour selected foundry coke as is made by the Empire Coal Co. at Empire, Ala. [795].

Apr. 19—New prices are made for Fairmont, Thacker, New River, Logan, Kenova and Kanawha districts and Putnam County in West Virginia; Thacker and Kenova districts in Kentucky; Districts Nos. 1 and 2 and Grundy and Platte Counties in Missouri; Cherokee, Crawford, Osage, Franklin, Linn and Leavenworth Counties in Kansas [794].

Apr. 21—New wage scale signed for Alabama region [797].

Apr. 22—"Lightless Night" order suspended till Sept. 1—Delegates from District No. 2 (central Pennsylvania) meet at DuBois, Penn., and decide against a strike and in favor of an investigation of wages by the United States Fuel Administration [796].

Apr. 23—Hitchman Coal and Coke Co. decides to withdraw its action against the United Mine Workers of America which related to the enforcement of so-called "ironclad" contracts with working men in its employ [840]—Lehigh Coal and Navigation Co. places girls as time-keepers, weigh-scale tenders, switch tenders, etc. [841]—Explosion in which three men were burned occurs at the mine of the Deep Vein Coal Co., West Terre Haute, Ind. [808].

Apr. 24—Commercial florists and enameled-ware manufacturers agree to reduce fuel consumption 50 per cent.—Joint conference held at Bridgeport, Ohio, relative to a new scale for No. 8 A seam [840].

Apr. 25—Contract signed for No. 8-A seam [840]—Men working at No. 11 mine of the Old Ben Coal Corporation are ordered back to work under pain of arrest under charges of conspiracy [841]—New prices are made for Indiana coal, of both "bituminous" and "block" variety; for Montana coal; for Macon County (Illinois) coal; for such Kentucky "Blue Gem" as is mined in Knox and Whiteley Counties by members of the Tricounty Blue Gem Coal Operators' Association, and for Tennessee "Blue Gem" mined in Campbell County by members of the same association; certain boxcar coal is given higher rates; order not promulgated till May 2.

Apr. 26—Meeting of West Virginia coal operators at Huntington to form state operators' association [807]—New maximum prices are made by Fuel Administration for special mines in Virginia [837] and also for coke made at Coalmont, Tenn., and from the Pratt seam in Alabama, also in Marion, Harrison, Barbour and Randolph Counties, West Virginia, and in the State of New Mexico [837]—Four collieries of the Nova Scotia Steel and Coal Co. are laid idle by a "holiday" of indefinite length, a holiday being taken because the mine workers are forbidden by law to strike.

Apr. 27—New zoning arrangements made in regard to shipments in box and stock cars and to the shipment of smithing coal [835]—S. E. Button, chief of the Department of Mines of Pennsylvania, agrees to issue orders against the employment of girls in and around anthracite mines [841]—Meeting of would-be seceders from the union [796]—Extensive modifications are made in the zoning regulations.

Apr. 29—The United States Fuel Administration increases price of coke 60c. per short ton where the coke is for export to foreign countries or for transport to a possession or dependency of the United States. The 5 per cent. on coke shipped across the Rocky Mountains may be added to 60c. under this order [837]—The mine workers of the Nova Scotia Steel and Coal Co. return to work for at least three days.

Harrisburg, Penn.

Fatalities in the state increased 25 per cent. from Jan. 1 to Apr. 15, this year, over the record for a similar period in 1917, according to reports of the Bureau of Statistics of the Compensation Board. The fatalities are divided as follows: Mines, 302; industrials, 362; public service lines, 182; making a total of 846 for the first three months and 15 days of this year. During the same period last year 296 employees were killed while at work in the mines, 320 in industrial plants and 82 on public service lines. The record for 1916, was as follows: Mines, 333; industrials, 276, and public service, 87.

Luzerne County heads the list with the largest number of fatalities in the mines this year, 68; Schuylkill county is second with 38; Lackawanna County third, with 32; and Fayette County has 30. Other counties of the state in which mining is one of the industries show few fatal accidents.

One of the reasons given for the fatality increase over the previous year is the employment of green help in and about the mines. Enlistments and the draft have taken from channels of industry many of the experienced employees, leaving vacancies to be filled from the available supply of labor to be obtained. Speeding up operations to meet the demand for coal has also had a tendency to bring about conditions which are considered as requiring attention.

Exemption of expert coal miners from the military draft, practical utilization of the natural gas now going to waste in the anthracite mines, and the mine-cave evil were the chief questions discussed by Governor Brumbaugh in his address to the Pittston District Mining Institute on May 4. The audience included 1400 mine officials.

The Governor declared for the exemption of the expert miner from the draft as a measure absolutely necessary for the maintenance of the production of coal at its highest mark during the progress of the war. On the question of utilization of coal gas, a favorite one of the Governor, he said that it was most fitting he should give expression to his views and hopes on the question in Pittston, because it was more than a half century ago that practical use was first made of mine gas, the expedient having been adopted in the old Tompkins mine of burning the gas at the foot of the air shaft as an aid to ventilation.

On the mine-cave problem, a vital question in the anthracite region, especially in Pittston, where disastrous caves occurred within a week, the Governor declared that, owing to the divided property title inter-

est, the rights of life and property came into conflict. As between the two, he declared life stood first. Governor Brumbaugh favored an adjustment based on an agreement between the interests affected. The Governor pleaded for loyalty to the country in the present crisis by the labor interests of the anthracite region to the end that the production of coal shall be maintained at its highest point. The Governor went to Pittston as the guest of the Pittston District Mining Institute.

Fairmont, W. Va.

The new executive committee of the West Virginia Coal Association, which will consist of an accredited representative of every district association in the state, will meet at Huntington on June 1 to outline the plan of procedure by which the state coal association is to be perpetuated in line with the resolution adopted at a mass meeting of coal operators of the state held at Huntington, Apr. 26.

The coal men are determined to work along lines where a conflict of interests can be avoided, and it is felt that there is no question but the association can find plenty of work to do without entering upon questions which affect different districts.

Each association in the state will name not only a member of the executive committee but an alternate as well. Where regular meetings of district associations are not to be held this month special meetings are to be called for the purpose of selecting representation on the executive committee of the state organization.

W. H. Cunningham, of Huntington, who is secretary of the state organization, emphasizes that the retiring executive committee vacates on June 1, and that the election of new members is therefore of the greatest importance, in a circular letter which has been sent to all associations and to coal operators who attended the Huntington meeting on Apr. 26.

As the result of a conference which was held by President C. H. Jenkins of the Central West Virginia Operators Association with officials of the Baltimore & Ohio during the previous week, the car supply in the Fairmont and adjacent fields was probably the best which has been observed there for some time, the supply being well sustained throughout the week. President Jenkins says that operators are now beginning to feel that the Baltimore & Ohio intends to do all that it can in the future, and that with closer cooperation between mine owners and the railroad the results would be most marked. The Fairmont region received 1148 cars on Apr. 27. On Monday the supply jumped to 1458, indicating to operators that the pledges of the Baltimore & Ohio were to be fulfilled. On Tuesday 1128 cars were furnished, only six mines out of 151 reported being closed down. Men idle numbered 1382, with a production loss of 13,545 tons. On May 1 the supply had dropped to 845 cars. Restrictions on shipments is a new order in the Fairmont field, but close attention is being given it. Wrecks in numerous instances have made such restrictions necessary.

Inasmuch as there are said to be at least 200 wagon mines in the Fairmont district, the decision of the Interstate Commerce Commission denying team track operators the use of open-top cars will materially affect many mines in the northern section of the state.

Charleston, W. Va.

Relief from freight congestion in the East, to some extent at least, is reflected in a much better car supply in all the coal districts of West Virginia during the past week, though conditions are even yet far from normal. There was a most marked improvement in the car supply in the Kanawha district the latter part of last week, 1148 cars being supplied to the mines of this district, for instance, last Friday. On the other hand, the delivery of loaded coal cars to connections from the Kanawha district showed a marked decrease over deliveries of previous days, the loaded deliveries numbering 833.

Chesapeake & Ohio officials claim that they are greatly hampered in trying to supply the mines on their lines with empties by the large number of "bad order" cars dumped on them in the interchange of cars, in which condition such cars are useless, while at the same time congesting the company's sidings. Requiring all the labor it can command to repair its own equipment, the company is unable to find labor to repair the cars of other lines, nor does the company believe that it is its duty to make such repairs.

In the smokeless district along the Norfolk & Western, the mines had 100 per cent. car service during the week ending Apr. 27, the production in that territory at the same time being 60 per cent. of normal, based on present "man-power" conditions and the ability of the coal companies to produce. Car service conditions and labor conditions have shown such a marked improvement during April that the total production for the month will probably establish a record for the present year. A total of 458,927 tons of coal was produced in the Norfolk & Western territory during the week ending Apr. 20 as compared with 436,985 produced during the preceding week, a net increase of 21,942 tons. Out of 200 mines in the Tug River and Pocahontas districts to be supplied during the week ending Apr. 20, only 17 hours were lost because of a shortage of cars.

Development work in connection with new coal projects in West Virginia may be halted and stopped entirely, except in special cases, if the new order discontinuing the putting in of new sidings, as it is now understood has been issued by the Director General of Railroads, is put into effect in this state. As understood in some sections at least, the new order prevents the laying of new sidings without regard to the length of the proposed siding. It is understood that the new order is based on the theory that to put in new sidings would not only require many cars now otherwise needed for the transportation of fuel, but would draw labor from mines already in existence to new projects and thus disorganize existing organizations. As a matter of fact operators point out that in the counties in which most of the new mines are being opened native labor is used—that is, labor not heretofore used in the mines—that being the case in Barbour, Upshur, Preston, Braxton, Gilmer and Monongalia Counties. It is only within the last year or two that coal mining has been undertaken in some of the counties just named.

Much capital has been invested within the last year in the counties of Fayette, Marshall, Brooke, Raleigh, Putnam, Lincoln, Mason, Nicholas, Webster, Randolph, Mineral, Harrison, Marion, Taylor, Wayne, Wyoming, Boone, Logan, Kanawha, Clay, Ohio, Mercer, McDowell, Mingo, Lewis and the counties already mentioned. In these counties plants have been installed, tipples built and applications for sidings approved, all such preparations not only representing an investment for charter and other legal requirements but an actual expenditure, so that if the companies who have made such preparations are unable to secure sidings it will result in serious embarrassment. Of 69 applications made to the Baltimore & Ohio for sidings recently none were granted.

Morgantown, W. Va.

Word has been received from the West Virginia University at Morgantown that the United States Bureau of Mines has agreed to co-operate with the University in the Short Course in Coal Mining, by placing Mine Rescue Car No. 8 at Morgantown for the two weeks' period June 17-29. This means that the men in attendance at the short course will receive their training in first aid and mine rescue from the Federal experts who accompany the car, and will have the benefit not only of the apparatus owned by the University but also that carried on the mine rescue car.

The headquarters of car No. 8 are at Huntington, and it is subject to call whenever an accident or explosion occurs which requires the use of the breathing apparatus. Needless to say, the men who are in charge of the car are really experts in mine rescue and first-aid work, and it will be quite a privilege for the students in the short course in coal mining to receive the personal instruction which the Federal engineers will give.

During the two weeks that the car is located at Morgantown the following subjects will be covered in the short course, in addition to the first aid and the mine rescue work—Mine Gases, Explosives, Timbering, Methods of Working, and the Prevention of Accidents. The short course is open without cost to any resident of West Virginia interested in coal mining.

Birmingham, Ala.

A thorough inspection of all coal being mined and shipped by the Alabama producers will be started immediately, and coal that carries dirt, slate or other impurities is likely to be returned at once. John DeB. Hopper, who has been appointed inspector of coal in Alabama by the fuel ad-

ministrator, is taking up the work with his assistants and will make frequent visits to shipping points, investigate coal being mined, loaded and shipped, and give instructions thereon when it is found there is the least carelessness in the cleaning process.

There is much activity in the coal mining section at the close of this week, but the output is not as large as it might be. Not only is there complaint that the labor is giving only partial effort, but it is also stated that much inefficiency is being found. There is more coal being mined now than ever. There is need for every ton of coal that can be mined. Shipments of coal are being rushed, and the car service, under Government regulation, including a zone system of delivery, is showing a steady improvement.

Readjustment of wages will go into effect at the mines May 15, and this is expected to be an inducement for better work and larger production. So far little buying of coal at mines is noted for next fall and winter consumption. The belief is strong that within 60 days there will have been a start on accumulating of individual stocks of coal for next winter's consumption.

Coke production shows no change, ovens operating nearly at the maximum of production. Shipments of coke from this district are not very extensive, the bulk of coke being made here being used in the local territory. Manufacturers of coke are not in a position to take on many, if any, new contracts for their product, and it may be sixty days and longer before any business can be considered. Revisions of coke prices for this state have brought about a better feeling in coke mining circles, though contracts are in hand that will last for some time.

It is officially reported that the Sloss-Sheffield Steel and Iron Co. is considering the erection of a large coke-making plant. J. W. McQueen, president of the company, has gone to New York, and it is stated that he will present suggestions to the company that may result in the erection of a large coke plant in the vicinity of Birmingham.

PENNSYLVANIA

Anthracite

Reading—Jonathan Reber, of this place, has a contract with the Lehigh Coal and Navigation Co. to dredge the dams in the Lehigh River this summer and take out the marketable coal. It is expected that many thousand tons of good coal can be reclaimed.

Scranton—Before Judge L. H. Barber, specially presiding, the mine-cave case of the Penn Store Co., Ltd., a subsidiary of the Scranton Coal Co., against the People's Coal Co., marks one of the first instances in the history of the anthracite industry where one coal company is suing another for damages caused by a mine cave.

Following out a policy inaugurated by the Delaware and Hudson Coal Co. some time ago, a safety-first institute was organized on May 3 by the employees of the Marvine colliery. It was announced that the company will award cash prizes for the best suggestions offered by members of the institute for the prevention of accidents. A cash prize of \$50 will be given for the best suggestion from an individual member; \$25 for the second prize and \$10 for third. For the best suggestion coming from an institute \$25 will be given; \$15 as second prize and \$10 as third prize.

Treventon—Disregarding a warrant issued by the Reading Railway Co. forbidding them to board an accommodation train from Shamokin to North Franklin colliery near here, 50 miners were arrested by special railroad officers and taken before a justice of the peace. They settled the case by paying nominal fines.

Nanticoke—Both cages at the Loomis shaft of the Delaware, Lackawanna and Western R.R. Coal Department, were wrecked on May 4 when traveling in opposite directions. In some unknown manner they collided. A force of workmen were at once put to work repairing the damage so that operations at the colliery could be resumed at once. No one was injured in the smashup.

Hazleton—Every one of the 16 mines of the Lehigh Valley Coal Co. in the Hazleton district having attained a 100 per cent. record in Liberty Bond subscriptions, the achievement was signaled on the evening of May 4 by the simultaneous sounding of the colliery whistles at 6 o'clock. Twenty nationalities are represented among the employees of the company, a considerable percentage of them from enemy alien countries.

Plymouth—The large coal washery of the Lehigh and Wilkes-Barre Coal Co., adjacent to the Parrish colliery breaker, fell to the ground with a crash shortly after 1 o'clock on the afternoon of May 1. All employees had been ordered out of the building. It was well that this was done, as a few minutes later the high and heavy building toppled a few inches to one side and fell, tearing loose steam and water pipes, smashing machinery and breaking heavy timber. The washery was erected about seven years ago by the Parrish Coal Co. and the company was taken over by the Lehigh and Wilkes-Barre Coal Co. about four years ago.

Freeland—In order to have everybody plant a garden this summer, the G. B. Markle Co. will furnish garden plots, fertilizer and plowing for the sum of \$1 for each garden. The employees held an informal meeting at the colliery clubhouse and talked over methods of cultivation and planned for the summer's work. The Philadelphia & Reading Coal and Iron Co. began this work last year, and late last fall it plowed land for this spring. The latter company has an expert cookery instructor going about among the homes teaching the housewives the best way to prepare the "Hooverized" war-time dishes.

St. Clair—The Delaware & Hudson Coal Co., which has operated solely in the Wyoming region in the past, is now proving and plotting its Schuylkill holdings in the vicinity of St. Clair and Middleport. It maintains an engineering force in Pottsville which takes care of the leased lands in this part of the field.

Maryd—The Maryd Coal Co. has installed two electric storage battery locomotives and an electric generating plant. The inside haulage equipment before the new installation consisted of gasoline motors and mules.

Pittston—One man was killed and another seriously injured, and more than 20 buildings in an entire block were ruined on May 1, when a cave occurred in the workings of the White Coal Co. Property damage will amount to tens of thousands of dollars. The cave is one of the most serious that has occurred in the anthracite region and is unusual in that the subsidence covered an enormous area at practically the same time. The cave was not unexpected, officials of the company having ordered the 40 employees out of the workings during the morning. It was predicted during the winter, after several minor caves had damaged property, that when the frost would leave the ground the entire "Hill" section would be endangered. The prediction was borne out by the cave during the afternoon. The White Coal Co. operates the Checker vein, and is practically all "robbing work." In 1917 the company mined 28,000 tons. The Lehigh Valley Coal Co. owns the lower veins, but not mined them for a number of years.

Wilkes-Barre—In orders handed down by the court recently appointments were made for the mine foremen's, mine inspectors, and miners' examining boards. The mine inspectors' board has three new members this year. The board consists of E. R. Pettebone and John M. Humphrey, mining engineers; Cornelius McLaughlin, of Avoca; John Larkin, of Nanticoke, and Thomas Gallagher, of Lansford, practical miners. Gallagher succeeds John J. Hanlon, of Avoca; Larkin succeeds Daniel B. Bolton, of Nanticoke, and Gallagher succeeds the late Peter Dougherty, of Lansford. The miners' examining board is composed of the following: Patrick McGuire, of Hazleton; Gustav Ulberich, of Wilkes-Barre; Michael H. Quinan, of Pittston; Harry Cook, of Nanticoke; James F. Gildea, of Plains; John B. Thomas, of Dorranceton; John H. Evans, of Plymouth; Alexander Patterson, of Hazleton; James McGlynn, of Jeanesville.

Bituminous

Lovejoy—The Estep Brothers Coal Mining Co. is equipping its new mine here with electricity throughout. A substation has been erected and the motor-generator set is on the ground. Three Jeffrey locomotives are ready to begin operation. The power will be furnished by the Penn Public Service Company of Indiana. The power will be turned on at the plant about May 15.

Starford—The mine of the Starford Coal Co. has been closed temporarily pending the drilling of a tract of land ahead of its present holdings. A fault was hit recently, and if the new field proves a success headings will be driven through the fault.

Blairsville—The Graff Brothers have opened an old mine near Smith Station and have their siding with the Pennsylvania R.R. completed. The first coal from the new operation was shipped a few days ago. The mine is in the Pittsburgh seam of coal.

Evans City—The Brewster mine of the Big Creek Coal Mining Co. near here is undergoing great improvements. The company is equipping the mine with electrical machinery and has its power lines and substation constructed. Shortwall mining machines are on the ground, as well as other electrical machinery. The power will be furnished by the Pittsburgh, Harmony and New Castle Street Railway Co. The production will be increased greatly, and the mine will be one of the large producers on the south end of the Buffalo, Rochester & Pittsburgh Railway.

Kanter—The new branch of the Baltimore & Ohio R.R. from Stoyestown station to the new mines opened by the Quema-honing Coal Co. on the Koontz farm, Shade Township, and operated as Ralph-ton No. 9, was recently completed and the shipment of coal has been commenced. At present the shipment is from a large amount of coal stored awaiting the opening of the road, but new homes for miners will be erected and the mines already opened will in a short time be operated to full capacity.

WEST VIRGINIA

Sutton—The Bristweiser Lumber Co. of Pittsburgh, Penn., is planning to develop a tract of coal land owned by the company in Eraxton County, near this city.

Elkins—Tests are being made by the Hayes Coal Mining Co. of Alton, of a property under option to the company in Randolph County, near Silica, on the Baltimore & Ohio, to ascertain whether or not the land is worth developing.

U. C. Edgell and associates have purchased from John T. Flynn a small acreage of coal near Wilsonburg, Harrison County, and will develop the property at once.

Charleston—The order of the Public Service Commission recently directing the Norfolk & Western R.R. to establish track connections and extensions and furnish cars to serve the mines of the Trace Coal Co. was upheld by the Supreme Court of Appeals.

Buckhannon—J. A. Tucker and J. J. Schargnecker have formed a partnership for the purpose of engaging in the coal mining business, the style of the firm to be known as the Scharfnecker-Tucker Coal Co., with mines at Ower's Mills and Hampton. The first car was loaded last week at the Ower's Mills mine. A plant will be installed at Hampton at an early date.

Moundsville—The boiler house and power house of the Central Coal Mining Co.'s mine, generally known as the Fort Pitt mine, on the Ohio side of the river opposite Moundsville, was destroyed by fire recently. The damage is estimated at about \$20,000. About 300 men are employed at the mine.

Weston—The P. C. Lynch Coal Co., of Beckley, has acquired 1000 acres of coal lands on Stone Creek, near Weston, from Thomas E. Miles, of Hornor, and T. S. Stalnaker, of Weston, for a consideration of \$72,000. The company recently acquired 400 acres in the same vicinity. It is arranging to erect a mining plant and build a new mining town near Weston at an outlay of \$200,000.

Grant Town—The New England Fuel and Transportation Co., which has the largest mine in West Virginia at this place, broke a record one day recently when it hoisted 1206 mine cars. The mine is splendidly equipped and on this day loaded 63 railroad cars in addition to supplying coal for its coke ovens.

Mt. Clare—There are four different openings on the Holden property of 12 acres, near here, and four different wagon mines convey coal to the commercial siding.

Fairmont—The Franklin Gas Coal Co., which has opened a 40-acre tract adjoining that of the Elkhorn Coal Corporation in Harrison County, is working a 9-ft. vein, conveying the coal by incline to a tippie.

Hallwood—The West Virginia Rail and River Coal Co. has purchased the fee of the properties located on the Ohio River near here, which it has been operating under lease for two years. The property consists of approximately 3000 acres and has a mine producing 400 tons daily. In addition there are miners' houses, valuable timber and salt wells on the property. S. F. L. Dean is president of the company.

KENTUCKY

Providence—Fire which recently broke out in the R. L. Forsythe mine was finally flooded out after it had been burning for several days. It will take several days to pump out the accumulated water. The fire started from a charge that was fired late in the evening, and which smoldered through the night.

Pineville—Lewis R. Jones has sold the Straight Creek Fuel Co. to Judge M. J. Moss, Ray B. Moss and M. J. Moss, Jr. The new owners expect to develop the mine. It is understood that Judge Moss purchased the property with the idea of allowing the boys to handle it.

Paducah—City authorities have been busy for several days in examining several coal properties, it having been decided that the city will own and operate her own mines. The city expects to buy a small mine either in the Clay or Providence district.

Harlan—The Clinton Coal Co., which was recently organized in eastern Kentucky, with headquarters at Hazard, plans establishment of a town on Carr's Fork, and expects to start immediate developments.

Whitesburg—Added impetus has been given to the Big Sandy field through the organization of the Somerset Fuel Corporation, by a party of West Virginia capitalists, who have secured the coal rights to several hundred of acres of land on the Big Sandy extension of the Chesapeake & Ohio.

Hawesville—L. S. Powers, a coal mine operator working mines near here, has installed a new set of air pressure coal mining machinery, which is expected to considerably improve production at the plant.

Hazard—The Hawley Coal Co., of Milwaukee, Wis., which recently increased its capital stock from \$3000 to \$50,000, is making improvements at its mine near Middlesboro, Ky., which will enable it to increase production to 100 tons a day.

Roxana—The Kentucky and West Virginia Coal Co., which operates mines here, has let contracts for construction of fifty miners' houses. Mine companies and oil producers have been making arrangements for better accommodations for employees, due to the fact that employees have to be better treated than ever to enable the employer to hold them. An oil company in Lee County is installing electric lights, hot and cold water and showers in each of a number of employees' bungalows.

TENNESSEE

Briceville—The Cross Mountain Coal Co. is increasing its output from the old mines and is opening up new mines, planning a new tippie, boiler house, office, amusement hall and picture theater. It is improving old houses and building new ones. The output is to be increased about six times over that of 1917.

INDIANA

Terre Haute—Terre Haute citizens are confident their city can secure the location of a Federal coal-washing plant. One is already in operation at Danville, Ill. Sulphuric acid, used in explosives, is made of iron pyrites, which Edward Bassett, state geologist, says Indiana has in liberal deposits.

Oakland City—Armed guards have been placed at the opening of Mine No. 4 by the Ayrshire Coal Co., owner of a system of large coal mines in this vicinity. Enemy activity, believed to be due to German sympathy, prompted the action. Several attempts were made in one day to wreck the electric motors of the mine. A motorman, as he rounded a curve with a string of loaded coal cars, saw an obstruction on the rails. On the next trip another obstruction was encountered. This was repeated every trip of the two motors during the afternoon, when watchmen were placed along the entry. Twice the watchmen saw men throwing props on the track, but each time they escaped into the old works. The mine, which is a large one, has about 15 openings.

Petersburg—All coal mines along the Evansville & Indianapolis R.R. in this part of the state are idle as a result of a dispute over freight rates. Many miners are leaving for employment in other fields. This situation has existed for some time. It is estimated that the daily loss in wages is \$10,000, as several hundred men are affected. So far, the fires in the engines have been kept burning and the mines clear of water, but it is feared that a permanent closing of the mines will occur if a satisfactory agreement is not reached soon. Many of the coal companies have lost heavily by the shutdown. One mine operated one day to supply coal for the oil field west of town.

ILLINOIS

Edwardsville—T. T. Brewster, president of the Mt. Olive and Staunton Coal Co., St. Louis, has applied to the circuit court for an injunction to restrain the City Coal Co. from operating Mine No. 3 and asks for an order that it be turned over to the Edwardsville Coal Co. Brewster says he has been operating the mine since 1913, when the lease of the other company expired. Representatives of the defendant company say that while their lease expired at that time, Brewster made no effort to intervene and they believed that the lease was automatically extended for five years.

Gillespie—The charter of the Gillespie Coal Co. has been filed. The capital stock will be \$100,000, the stock to be distributed as follows: S. M. Westwood, \$25,000; D. E. Alyward, \$12,500; R. H. Isaacs, \$12,500; W. F. Schmidt, \$12,500; G. W. Schmidt, \$12,500; B. K. Leach, \$12,500; and H. A. Anderson, \$12,500. The company owns 559 acres of coal land near Gillespie, the rights being located under the southeast quarter of Section 12, the north half and the southeast quarter of Section 13, Town 8, range 7. The Big Four railroad has announced that necessary arrangements have been completed for the running of a miners' train between Gillespie and the new No. 4 mine of the Superior Coal Co. It will leave the Big Four depot at 6.15 a. m. and return at 5.15.

Carlinville—The four mines of the Standard Oil Co. will produce 14,500 tons of coal daily when they are running at full capacity. The two mines northeast of town are down 200 ft. They will be known as No. 2 and No. 3. Each will employ 1100 men and each will produce 5000 tons of coal daily. The third new mine will be known as No. 4. It is now ready for the tippie. This mine will employ 550 men and will produce 3000 tons daily. The old mine at the edge of town will be known as Mine No. 1. It will employ 350 men and will produce 1500 tons of coal per day. The Carlinville Home Builders Association, an organization composed of bankers and business men of this city, will erect 300 new houses to help care for the influx of miners and their families. The Chicago & Alton R.R. has built a spur to the No. 4 mine and is rushing work on spurs to No. 2 and No. 3. The Chicago & Alton and the Illinois Traction System have arranged to run shuttle trains between the city depots and the three mines.

Personals

Fred C. Pavey, of the Baum Coal Co. of St. Louis, Mo., has gone to the Wickham Coal Co. as sales manager. The Baum Coal Co. has arranged to close its St. Louis office.

W. C. Tucker, formerly superintendent for the Wisconsin Steel Co., at Benham, Ky., has been appointed general superintendent for the Cross Mountain Coal Co., at Briceville, Tenn.

B. R. Craig, acting general superintendent and chief engineer of the Shawmut Mining Co., St. Marys, Penn., has been appointed general manager and chief engineer of the same company.

C. J. McKee, district mine inspector Associated Companies, Kittanning, Penn., has resigned to accept the position of safety engineer with the Jamison Coal and Coke Co., Barrackville, W. Va.

P. G. Elder, assistant mine superintendent, Buckeye Coal Co., Carmichaels, Penn., has resigned to look after his mining interests near Walsenburg, Colo., where he will be located after May 15.

J. W. Bowles has been appointed safety inspector with the Pittsburgh Terminal Railroad and Coal Co. He was formerly district mine inspector of the Associated Companies, Pittsburgh, Penn.

Martin Maloney, formerly with the Jefferson and Clearfield Coal and Iron Co. at McIntyre, Penn., is now in charge of the Armerford mines of the Armerford Coal Mining Co. near Blairsville, Penn.

Edward McCleary, formerly mine inspector with the Associated Companies, Pittsburgh, Penn., has been appointed chief safety inspector of the Victor American Fuel Co., with headquarters at Denver, Colo.

John Gordon Smythe, chief engineer of all divisions of the Consolidation Coal Co., has been made a captain in the Officers' Reserve Corps and expects to report for

duty soon. He will likely be assigned to construction work.

D. H. Parker, formerly mine superintendent at the Soudan Mine, Youghiogheny & Pittsburgh Coal Co., Van Voorhis, Penn., has recently been appointed general superintendent for the W. H. Warner interests at Charleroi, Penn.

T. C. Miller, for eight years chief engineer for the Wisconsin Steel Co., Benham, Ky., has been appointed chief engineer for the Cross Mountain Coal Co., at Briceville, Tenn. He has also been made assistant to the general superintendent.

George Love, who has been with the Cowanshannon Coal and Coke Co. at Yatesboro, Penn., has moved his family to Rochester Mills, Penn., and has accepted a position as superintendent of the Savan mine of the Savan Colliery Co. there.

W. F. Nansteel, for six years master mechanic for the Wisconsin Steel Co., Benham, Ky., but late of the boiler inspection department of the Hartford Insurance Co., Pittsburgh District, is now master mechanic of the Cross Mountain Coal Co., Briceville, Tenn.

David Whitcomb, fuel administrator for the State of Washington, has been notified by Fuel Administrator Garfield of his appointment as executive secretary to the National Fuel Administration, with headquarters at Washington, D. C. Mr. Whitcomb has accepted and will take up his new duties about May 15. Mr. Whitcomb's appointment follows close upon a stay of more than a month in Washington, D. C.



DAVID WHITCOMB

whither he was called by Dr. Garfield for conference. He was appointed state fuel administrator last September and organized his office locally and state-wide immediately on his return to the city in October, 1917. He is a native of Worcester, Mass., a graduate of Amherst College and the Harvard Law School. He is the head of the Arcade Building and Realty Co., president of the Seattle Building Owners and Managers Association, and was Seattle manager of the Red Cross drive last summer.

Thomas Hogarth has resigned as mine foreman of Penn Mary No. 2 mine, of the Penn Mary Coal Co. at Heilwood, Penn., to become mine foreman of the new Coal Run Nos. 4 and 5 mines at Kent, Penn. Mr. Hogarth is considered one of the best mining men in Indiana County.

James Keener, of Howesville, Preston County, W. Va., has resigned as superintendent of the Allbright Smokeless Coal Co., and is developing a mine for himself nearby. He has been succeeded by **Charles Brennan**, of Thomas, W. Va., a former employee of the Davis Coal and Coke Co.

Charles F. Ice, for 30 years identified with coal mining in northern West Virginia, and who is viewed as one of the most capable men in the Fairmont district, which includes twelve and a half counties in the Northern-Central part of the state, has been appointed chief inspector of coal for the Fairmont district, working in conjunction with the District Representative of the Fuel Administration and having his office at Fairmont.

F. A. Dalburg, mining engineer, has recently returned from Valparaiso, Chile,

following two years prospecting work through Chile, Bolivia and Peru. Previous to this South American work Mr. Dalburg spent two years in the Philippine Islands, one year in China, and eighteen months at Spitzbergen, Norway, in coal-mining work. He has now affiliated as chief engineer with the Humble Oil and Gas Co., Wichita Falls, Tex., where he may be reached after May 15.

James E. Anderson, formerly chief mine inspector with the Associated Companies, Pittsburgh, Penn., has resigned to take up new work as chief safety engineer of the mining department with the Rockwood-Badgerow Co., of Chicago, Ill. His thirty odd years' experience in coal mining through Illinois and the Middle West, combined with a most genial personality, has gained "Grandpa" Anderson thousands of friends in the coal-mining fraternity, all of whom wish him unbounded success in the new work.

Obituary

Robert Morrison Olyphant died at his home, 160 West 59th St., New York, recently. He was well known to the older members of the coal trade. He was connected with the Delaware & Hudson Co. from 1873 to 1903, first as manager and then as president, and at the time of his death was honorary chairman of the executive committee of the company.

W. F. Jacoby, president of the Calumet Coal Co., 17 Battery Place, New York City, died at his home on May 1. Mr. Jacoby was at one time a station agent for the Philadelphia & Reading Co. Later he was connected with the Davis Coal and Coke Co., then he organized W. F. Jacoby & Co., which was later merged into the Fenn Collieries Co. In 1906 Mr. Jacoby withdrew from the latter company and became president of the Barton Coal Mining Co., with a mine at Barton, Md. About a year ago he, with C. W. Proctor, organized the Calumet Coal Co., the business of which will be continued.

Industrial News

Charleston, W. Va.—The White Ash Block Coal Co. has given notice of its intention to surrender its corporate charter and to go out of business.

Goodwill, W. Va.—The Foursome Block Collieries Co. has filed notice of an increase in its capitalization from \$100,000 to \$150,000, to provide for expansion.

Pittsburgh, Penn.—The Aspromet Co. announces the removal of its New York office to 170 Broadway. The telephone number, Cortlandt 5428, remains unchanged.

New York, N. Y.—Exports of coal from the Port of New York during the month of March were 2607 tons of anthracite, 4508 tons of bituminous and 956 tons of coke.

Knoxville, Tenn.—The Cross Mountain Coal Co. has filed notice with the Public Service Commission of an increase in its capital from \$100,000 to \$200,000, to provide for expansion.

Blocker, Okla.—The Tri-State Coal and Coke Co., recently incorporated with a capital of \$100,000, has perfected its organization, and is planning for the immediate development of about 230 acres of coal lands. J. E. Stillwell is president.

Pennington Gap, Va.—The Cumberland Collieries Co. has been organized, and is planning for the immediate development of a large tract of coal lands recently acquired in Lee County. E. H. Easley is president; V. L. Sexton is vice president.

Alden, Penn.—The Alden Coal Co. is having preliminary plans prepared for the construction of a new one-story coal washery, about 45 x 50 ft., at its plant, to cost about \$20,000. Frank B. Davenport, Coal Exchange Building, Wilkes-Barre, is engineer.

New York, N. Y.—The George Haiss Manufacturing Co., 365 Rider Ave., manufacturer of coal-handling machinery, has had plans prepared for the construction of a new one-story brick building, about 55 x 65 ft., on Rider Ave., near 141st St. The estimated cost of the structure is \$15,000.

Indian Bottom, Ky.—The Rockhouse Coal Co., recently organized, is planning for the immediate development of about 200 acres of coal lands recently leased in the Rock-

house Creek fields, Letcher County, to have a daily capacity of about 1000 tons. P. M. McClanahan is president and manager.

Washington, D. C.—Construction of 50 wooden barges 3500 tons each, for use in the coastwise coal trade, has been authorized by the Shipping Board. The vessels will be built at New England and South Atlantic shipyards. They will aid materially in solving the problem of keeping New England supplied with coal.

New York, N. Y.—The Wilputte Coke Oven Corporation has been awarded a contract for the construction of 40 Wilputte ovens, with extensions to existing byproduct plant and benzol plant, by the Citizens Gas Co., of Indianapolis. Work has been started and the plant is expected to be in operation by December, 1918.

Columbus, Ohio—Improved conditions in the distribution of coal in the various cities in Ohio and Michigan have caused the Federal Fuel Administration to issue an order dissolving the distributing pools at Columbus, Cincinnati, Cleveland, Akron, Canton, Toledo and Detroit. The pools were in operation since early in January.

St. Louis, Mo.—The Interstate Commerce Commission hearing on the application of the St. Louis Chamber of Commerce for the abolition of the bridge arbitrary of 20c. a ton on coal, which was set for May 6, has been postponed to June 3, at the request of the railroads, concurred in by the East St. Louis Chamber of Commerce.

New York, N. Y.—The following officers were elected at a recent meeting of the Alberger Pump and Condenser Co., 140 Cedar St.: President, William S. Doran; vice president, William R. Wilson; secretary, Richard C. Williams; treasurer, Frederick A. Brockmeier. George Q. Palmer was elected chairman of the board of directors.

Des Moines, Iowa—The Flat Brush Coal Co. is planning the opening of a mine at Melcher, W. Va., at a cost of \$100,000. When completed the mine is expected to have a capacity of about 400,000 tons a year. Engines, boilers, screens, cars and rails have not yet been purchased. E. C. Smith is superintendent in charge of construction.

St. Louis, Mo.—Sebastian A. Weissenborn, coal operator, has moved from offices on Olive St., between Third and Fourth Sts., which he had occupied for 37 years, to new ones in the Boatmen's Bank Building. He moved on his seventy-third birthday. He has been in business in St. Louis 40 years and is now associated with his son, J. E. Weissenborn.

Springfield, Ill.—Although the present contract for supplying coal to the various Illinois state institutions does not expire until July 1, the state is preparing plans and specifications for the new contract. It is said that bids will be asked early this year on account of the uneasiness which has prevailed in the state over a possible shortage of fuel for state institutions.

New York, N. Y.—C. Andrade, Jr., of Matlack Coal and Iron Corporation; J. M. Leonard, of the Brothers Valley Coal Co., and Gardner Pattison, of Pattison & Bowns, have been elected directors of The Wholesale Coal Trade Association of New York City to fill the vacancy existing as the result of the authorization given the Board of Directors to increase its membership to eleven.

Charleston, W. Va.—The Federal Coal Co., recently incorporated with a capital of \$3,000,000, is planning to organize subsidiary companies for the development of 33,000 acres of coal lands in Boone County and 22,300 acres in Nicholas County. The company has already ordered a large amount of equipment and it is said that about \$500,000 will be expended for improvements.

Columbus, Ohio—Contracts have been awarded by the Columbus Board of Education for approximately 10,000 tons of coal for the various school buildings of the city. The Reliance Coal Co. secured the larger contract to supply 28 buildings with Hocking mine-run at \$5.05 delivered. Scholl & Graham will supply 12 schoolhouses at \$5, and the Hamilton-Parker Co. 12 school buildings at \$4.90.

Oakland, Md.—The Taylor-Offutt Coal Co. has been organized and is planning for the immediate establishment of a plant for the development of 800 acres of coal lands about three miles from Oakland. H. N. Taylor, of Philadelphia, Penn., is president; William R. Offutt, of Oakland, is vice-presi-

dent; Julius C. Renninger, Oakland, is secretary; and William W. Justice, Philadelphia, Penn., is treasurer.

Evansville, Ind.—Coal prices in Evansville and Vanderburg county will not be affected through an order of the state fuel administrator received by George S. Clifford, county fuel administrator for Vanderburg county. Lump coal will be delivered in the city at \$3.85 to \$4.40 a ton, the price to the consumer depending on the source from which the coal comes. The prices are the same as those of last winter.

Indianapolis, Ind.—The question of whether coal, transported to points on the Ohio River in Indiana, may be shipped from these points to other cities in the State by rail, under the zone system, was presented to the state fuel administration by Harry Dowd, fuel administrator for Jennings County. The question was referred to C. G. Hall, district representative of the national fuel administration, with offices at Terre Haute.

Cincinnati, Ohio—Permission has been granted to Cincinnati coal dealers to increase their selling price 25c. per ton. This action was taken by Chairman Albert Bettinger, of the Hamilton County Fuel Committee, after hearing the request, presented by James A. Reilly, general manager of the Queen City Coal Co. He showed that there is a big increase in the cost of delivery and claimed that an advance was necessary to cover the increased costs.

Hartford, Conn.—The Terry Steam Turbine Co. has appointed E. E. Maher as manager for the Chicago District, with offices at 1328-29 McCormick Building, 322 South Michigan Ave. John D. Stout has been appointed manager of the New York office, in charge of that district with the exception of navy and marine installations. Mr. Stout has been assisting Mr. Herbert, formerly in complete charge of that district, who will now devote his entire time to navy and marine requirements.

Pittsburgh, Penn.—E. J. Fraenheim Jr., president and secretary of the Logansport Coal Co., has organized the E. J. Fraenheim Coal Co., with a capital of \$200,000 to develop operations in Somerset County. Two miles of railroad are to be built. The mine will be electrically equipped for an output of 1000 tons a day of smokeless, byproduct and smithing coal. It is situated on the Western Maryland R.R. E. J. Fraenheim is president, C. F. Roy, vice president and Nettie M. Fraenheim, secretary.

St. Louis, Mo.—The Ajax Coal Co. has been incorporated here for \$25,000 by Ralph D. Woodley, C. J. Dolan and L. Jaech. They have arranged to open up a yard at Theresa Ave. and Gratiot St. and engage in the retail coal business. This is generally supposed to be a subsidiary company of the Taylor Coal Co. of Chicago, which also is supposed to control the Energy Coal and Supply Co., with retail yards in southeast Missouri, and the Distributors Coal Co. and the J. W. Reiner Coal and Lumber Co., also of Chicago.

Terre Haute, Ind.—Indiana mines reached a maximum of more than 75 per cent. of their capacity for the week ended Apr. 20. Horace H. Herr, director of publicity and conservation of the state fuel administration, has announced in the Terre Haute district 13 mines of the 96 in operation in the district were closed one day of that week because of a lack of cars. The Southern Indiana bureau reported only five of its 41 mines closed on Saturday of that week. Mining conditions throughout the State showed a slight improvement over the preceding week, Mr. Herr said.

Kansas City, Mo.—United States Fuel Administrators Webster of Iowa, Kennedy of Nebraska, Crossley of Missouri, Cary of Kansas and Couch of Arkansas, and E. J. Wallace, of the Missouri Retail Coal Merchants Association, with Mr. Hope, of the Fuel Administration at Washington, held a conference here on May 6 to determine the tonnage of anthracite that moved into this territory in 1916 and 1917, and what tonnage is coming from the same shippers at this time, with the intention of taking steps to see that there is an equal distribution of tonnage for the Central West.

Jefferson City, Mo.—Fuel Administrator Crossley has made an emphatic ruling on the illegitimate shipment of coal to associations or individuals who are not licensed dealers, which is generally called "snow-birding." He has ruled that the act to regulate a man's business also carries with it the assumption that he must protect that business. He has licensed every dealer in

the state. Corporations that retail coal to their employees, etc., may have action taken against them for the violation of the incorporation laws, if their charter does not specify that they are to engage in the retailing of commodities such as coal.

Alton, Ill.—At a conference of Chairman George M. Potter of the Alton Fuel Committee with the dealers of Alton, Wood River and East Alton, at the Board of Trade rooms here, the dealers filed a formal protest against the rule permitting mines having coal-washing equipment to charge an additional 20c. a ton. It was declared that the mining companies, taking advantage of ambiguity of the rule, were charging 20c. additional whether the coal was washed or not, and it was shown that only part of the coal is washed at any mine, although the increase is charged on the entire output. The protest was taken under advisement.

Columbus, Ohio—While ice in the upper lake passages has been hindering the opening of the lake trade, still there has been a considerable tonnage from Ohio and West Virginia mines loaded at the lower lake ports. Reports show that the ice is moving away well, and it is expected that the lake trade will be in full swing by May 15. The Hocking Valley docks at Toledo loaded 131,900 tons up to May 4. Of that amount 25,832 tons were loaded prior to Apr. 20; 20,250 tons during the week ending Apr. 27 and 85,810 tons during the week ending May 4. The Toledo & Ohio Central R.R. loaded 39,000 tons up to Apr. 26 and 38,000 tons the week ending May 3, making a total of 77,000 tons for the present season.

New York, N. Y.—Action toward securing a supply of coal for the poor of New York city was taken at a meeting of the Executive Committee of the Committee on Domestic Supplies of the Mayor's Committee on National Defense on Monday of this week. City Chamberlain Johnson assured the meeting of the financial support of bankers who will loan money at a low rate in order to purchase the coal. Michael Burns, of Burns Brothers was appointed a committee of one to call a meeting of coal distributors of the various boroughs, and to have a committee of the distributors meet in conference with the Executive Committee of Domestic Supplies, when definite steps will be taken toward securing the coal.

Cincinnati, Ohio—The Hamilton County Fuel Administration has granted retail dealers an additional 25c. in price, effective May 15, on account of increased delivery cost, evidence that in some instances delivery costs have increased 100 per cent. being presented to the Administration. The Fuel Administration has directed the City of Cincinnati to make arrangements at once for the winter's coal supply for schools and city institutions, including the fire department, in order to aid in the movement to get as much work as possible out of the way before winter. The Cincinnati Traction Co. reports that it is accumulating reserves as rapidly as possible, present receipts running 1000 tons a month over current requirements.

Grafton, W. Va.—At the regular monthly meeting of the Grafton Coal Operators Association, held at the Willard Hotel here on May 2, George S. Brackett, of Flemington, W. Va., general superintendent of the Pitts-Vein Coal Co., was elected secretary-treasurer of the association, to succeed H. R. Bissell, resigned. David Williamson, of Wendel, Taylor County, W. Va., general manager of the Maryland Coal Co. and Simpson Creek Coal Co., was elected vice president to succeed Mr. Brackett. Mr. Brackett and Thomas Murphy, of Austin, W. Va., president of the association, were selected as delegates to attend the meetings of the state association being formed at Huntington, W. Va., and the next meeting of the National Coal Association at Philadelphia, Penn.

Columbus, Ohio—The recent order of the Director General of Railroads, prohibiting the construction of spurs and switches to new mines, excepting when the individual projects are approved by his department, has effectually stopped all mine development work in the Hocking Valley mining district. This is shown by the total absence of leases announced by the Buckeye Coal and Railway Co., of Columbus, which has been making on the average of about three leases weekly for new openings. The Buckeye Coal and Railway Co. controls a large acreage in the Hocking Valley and has been making innumerable leases to small operating companies for the opening of mines. The present company retains the sale of coal, and many tons were added to its selling amount as the result of the leases.

MARKET DEPARTMENT

Weekly Review

Early Buying a Stimulus to Production—Soft Coal Output Still Behind—Labor Short in Anthracite Region—New England Outlook Poor—Lake Trade Gaining Momentum

PTIMISM rightly comes with sunny skies and high temperatures. The Fuel Administration early recognized this fact, and the "buy-your-coal-early" campaign was the result. With warm weather, argued Dr. Garfield, the public will soon forget the experiences of the past winter and delay until fall the buying of coal. This delay, the Fuel Administrator foresaw, would mean that many mines would have to close down for lack of orders, and as a stimulus to production the public is being urged to order its coal now—during the spring and summer months.

The matter of a sufficient supply of bituminous coal in this country has never been simply a question of production. It is at all times a question of adequate transportation facilities. The car-supply problem, furthermore, is one that seriously affects only the soft-coal mines of the country—the mines from which must come the fuel to keep our vital war industries going. It can readily be seen, therefore, that the final solution of the coal problem, insofar as it affects the shortage of bituminous coal, rests in large measure with the Railroad Administration.

Nothing proves this statement more conclusively than the showing made by the bituminous mines during the last two weeks, when record tonnages were produced. For the week ending Apr. 27, owing to an improvement in the car supply, these mines shipped a total of 11,668,000 short tons, an increase of 5.7 per cent. over the preceding week. For the four months ending April, 1918, the production of soft coal is estimated at 181,992,000 short tons, which is an increase of more than 5,000,000 tons, or about 3 per cent. over the same period in 1917.

In order to meet the estimated demand of 620,000,000 tons this year, however, the production for the first four months of 1918 should have been over 206,000,000 short tons. In other words, the soft-coal supply is behind more than 25,000,000 tons. Whether production will be maintained at a rate that will overcome this shortage depends on the railroads.

To the degree in which transportation difficulties are solved will the soft-coal problem be solved. Not only must the mines receive plenty of cars, but

these cars must be distributed evenly over the entire week. A 100 per cent. car supply on Monday and nothing for the rest of the week will not correct the situation.

While the eastern bituminous fields are working short time for the reasons mentioned in the foregoing, the operators in the states west of the Mississippi report that they are forced to shut down because the public is not buying coal. The mines in these states can easily take care of the consumers in the respective territories allotted them under the zone system, but they must be kept working to maximum capacity during the entire year in order to provide a proper supply. The railroads, too, should be buying their coal now, so as not to conflict with industrial and domestic demand in the fall.

The anthracite region, instead of being confronted with a car-shortage problem, is hampered by a scarcity of labor in its efforts to maintain maximum production. The shipments of anthracite during the week ended Apr. 27 totaled 39,522 cars, an increase of 392 cars over the preceding week. This production is insufficient to take care of the demands, and the public, anticipating another scarcity next winter, is insisting on prompt deliveries. In the meantime more and more men are being drawn from the mines by the draft, while quite a number desert for other industries. The outlook for anthracite is not over-pleasing.

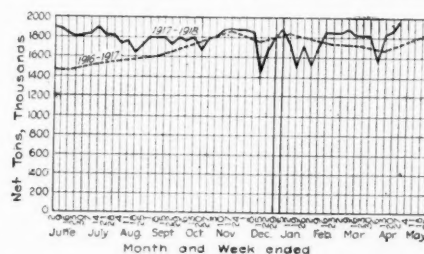
New England seems to be in a bad way for both anthracite and bituminous. With the needs for 1918-1919 fixed at 10 million tons by rail and 20 million tons by water (an increase of 5½ million tons by way of water transportation) the quantity sent there so far this year is below normal. Unless shipments are speeded up, the New England States will suffer a shortage next winter that will be even worse than it was last winter.

Shipment over the lake routes is proceeding in considerable volume, though the movement from the mines to the loading docks has diminished. Cargoes are not available for all the carriers offered, and as the ore movement is not yet large, ships are being detained at the ports to await the arrival of coal from the mines. Little anthracite coal has been loaded to date.

COAL PRODUCTION

The week ended Apr. 27 recorded not only the highest rate of production of bituminous coal during the past twelve months but the third successive week of rising production. Production of bituminous coal (including lignite and coal made into coke) is estimated at 11,668,000 net tons, an increase of 5.7 per cent. over the preceding week. The average production per working day is estimated at 1,946,000 net tons compared with 1,840,000 net tons last week and 1,680,000 net tons during April, 1917. Production for the month of April, 1918, is estimated at 46,478,000 net tons, an increase of 4,400,000 net tons, or 10 per cent., over April of last year. Production for the four months ended April, 1918, is estimated at 181,992,000 net tons, an increase of over 5,000,000 net tons, or 3 per cent. compared with the same four months of 1917. The production of beehive coke during the week ended Apr. 27 is estimated at 652,000 net tons, compared with 614,000 the week previous. The average daily production is estimated at 109,000 net tons, an increase of 7 per cent. over last week.

The operators reporting produced 8,551,767 net tons or 77.5 per cent. of total production. These 4617 mines were operated to 72.2 per cent. of their full-time capacity during the week of Apr. 20. Losses attributed to car shortage declined from 18.1 per cent. the week of Apr. 13 to 16.2 per cent. and no market losses from 2.8 per cent. to 1.8 per cent. Labor shortage losses were reported at 4.8 per cent. of full-time capacity, as against 3.6 per cent. the week previous. Western Pennsylvania operators, representing 13.7 per cent. of the production of operators reporting, produced 81.8 per cent. of their full-time capacity, compared with 72.2 per cent. the week of April 13. Operators in the Fair-



mont field of West Virginia report production at 50 per cent. of their full-time capacity compared with 40 per cent. the week previous. Increase in production is attributed to improved car supply. Hazard and Northeastern Kentucky operators report increased production due to improved car supply. Improved car supply is also reported by the Cumberland-Piedmont operators and the Western Kentucky operators, but such improvement is partly offset by strikes in the former fields and labor shortage in the latter. Operators in western and Pacific coast states report increased production due to better market conditions. Kansas and Missouri operators alone report material decrease in production due to car shortage.

Beehive Coke—Improved car supply and better labor conditions caused beehive coke production in the Connellsville and adjacent districts to reach the highest point attained this year. Sixty-one of the principal operators reported production of 324,800 net tons during week ended Apr. 27, or 75.2 per cent. of their full-time capacity. The same operators shipped 166,450 net tons of coal.

Byproduct Coke—An increased supply of byproduct coal during week ended Apr. 27 resulted in the largest production since the weekly statistics on byproduct coke were begun. The plants of the country operated at 89.1 per cent. of maximum capacity as compared with 88 per cent. the week previous. Out of a loss of potential capacity of 10.9 per cent., only 5.1 per cent. was lost for lack of coal. No labor difficulties reducing output were reported. Losses due to repairs to plant decreased slightly. Material improvement

was reported by operators in New Jersey and Ohio, production by the operators of the former state rising from 84.7 per cent. the week of Apr. 20 to 88.8 per cent., and by the operators of the latter state from 93.8 per cent. to 96.6 per cent. Lack of byproduct coal caused the operators in Indiana to report the lowest ratio of production to maximum capacity at 79.2 per cent.

CARLOADS OF COAL AND COKE ORIGINATING ON PRINCIPAL COAL-CARRYING ROADS

Week Ended
Apr. 6 Apr. 13 Apr. 20 Apr. 27

Bituminous shipments, 123 roads. 160,178 188,311 193,667* 204,599†
Anthracite shipments, 9 roads. 32,223 37,760 39,130* 39,522†

* Revised from last report. † Subject to revision.

Anthracite shipments slightly increased during the week of Apr. 27. Nine roads reporting 39,522 carloads compared with 39,130 during the preceding week.

BUSINESS OPINIONS

Bradstreet's—With the Government operating in practically every essential line, civilian trade, while still large, has been subjected to further repression. Vim in war work, speeding up of the Liberty Loan campaign, extraordinarily large Government orders, further improvement in the outlook for food crops, and more cheerful sentiments regarding operations on the warring fronts, which latter factor is reflected in financial markets, are overshadowing features.

Dry Goods Economist—It is understood that all wool in the possession of dealers or growers, the new clip of 1918, and wools that are in transit from foreign countries will be put at the disposal of the Government and the major part of it will be taken over for army needs. The residue—the extent of which cannot be estimated—will later become available for the manufacture of fabrics for the civilian population's use. In cottons, the impression is growing that price regulation is nearer than ever before, and, according to statements by leaders in Congress, cotton exchanges may be closed by the Government to put a stop to speculation.

Marshall Field & Co.—Current wholesale distribution of dry goods is well ahead of the corresponding period of a year ago. Road sales for both immediate and future shipment show good increases over the same week in 1917. Merchants have been into market in about the same numbers. Collections are excellent.

Atlantic Seaboard

BOSTON

Anxiety continues over inability of consumers to make contracts. Important industries on priority list still uncovered. Railroad fuel question waits decision. State administrators now placing requisitions with district representatives. "Storrow order" all-rail cancelled, but will continue in new form. Water receipts disappointing. Thirty-four new ships coming from the Lakes. Work of paring down fuel allowances to "non-essentials" continues at Washington. "Smithing coal" prices flourish mildly. Anthracite receipts all-rail curtailed through embargoes. Large volume of steam sizes coming forward. Barges move slowly.

Bituminous—Notwithstanding that already six weeks of the coal year have passed, there is as yet no well formulated plan of handling the requirements of plants both large and small whose output is of great importance to the Government. Washington indicated a program, but tested by results it falls short of being practical and there is a wavering between state fuel administrators and Washington as to what requirements are to be made special cases and what are to be left to individual action and to chance. While New England plants are able to keep running on supplies eked out here and there, the anxiety increases over receipts in future. Production shows gains over a month ago, but so far New England has had a small share of the increase.

The situation here is the more urgent because of the Army's great need of cloth for uniforms, and every pressure is now being exerted upon textile mills to speed up their output. Supplies needed by the Red Cross are also dependent upon coal for

New England cotton factories. One of these plants alone making army shirtings as well as surgical dressings, is using 4000 tons weekly, and because of labor and other conditions the great bulk of this fuel should come forward in weekly proportions. It should also come by water were the facilities adequate, but in the great shortage of shipping there is really no hope of keeping such a plant in operation exclusively by water borne coal.

Operators who furnished coal all-rail last year are many of them embarrassed by their interrupted negotiations with railroads. The latter are apparently obliged to wait until the Railroad Administration decides upon a policy. Meanwhile there are still "assigned cars" for certain railroad fuel, although the program of the Fuel Administration is all against them. Railroads in this territory that a fortnight ago were almost frantic in their efforts to relieve themselves of engine coal congestion now find the volume of coal in transit so much smaller that they are not adding to their storage as they were hoping to do.

The Garfield-McAdoo orders of Jan. 3, usually called the "Storrow" order, has now been cancelled, effective May 8, but a small volume of coal will continue to be at the disposal of the New England Fuel Administration for emergency purposes. Some of this coal to the extent of 20 cars daily is moving to each of three loading piers, namely, Port Reading, N. J., South Amboy, and Curtis Bay, Md. There is reason to believe that the "Storrow" order will soon reappear in new form for delivery all-rail. It is probable the different district representatives will be expected to furnish a given number of cars weekly, the same as has been done since Apr. 1, when "assigned cars" were abolished on the east end of the Pittsburgh division of the Pennsylvania Railroad.

At Hampton Roads it is again a case of too few bottoms for the coal available. Dumping has again slackened on this account and consumers at this end are correspondingly disappointed. The terminals here are by no means worked to capacity, although there are periods when demurrage accrues either on account of steamers "bunching" or because many of the steamers would not in normal times be considered at all suitable for this trade. The price regulations also have a bearing on the irregularity of loading and rehandling. The 35c differential in favor of New River tends to create a preference for the piers where Pocahontas can be furnished, and at this end the heavy bonus granted "retail dealers" offers a strong temptation to factors who would ordinarily forward their coal from railroad piers.

In this connection the United States Shipping Board has authorized the statement that from now on there will be a steady flow of completed new vessels from the Great Lakes shipyards. Thirty-four of these are now en route for Atlantic ports, and of the whole number soon to be available 16 to 20 are to be put into the coastwise coal carrying service from Hampton Roads to New England. They approximate a total of 50,000 tons, but at least three times as many more are needed.

Under the wide open regulation as to coal for "smithing purposes" a fairly good-sized tonnage is moving into New England at prices around \$7 f.o.b. mines. It is one of the scandals that the same kind of coal merchant who dabbles in "smithing coal" is also permitted to charge any rate he pleases on barge transportation that he may happen to have under "contract."

Anthracite—Embargoes continue an upsetting factor in receipts all-rail for a large area. A further cause is the recent repairs to Poughkeepsie Bridge in order to make it suitable for the new type of locomotive, several of which have already been delivered. A considerable tonnage of barley and culm is coming through for those steam-users who want to be forehanded.

Water shipments are still much hampered by the lack of tugs, although there are now domestic sizes on hand almost everywhere. At the same time the stocks on the wharves of Boston retail dealers is less than 25 per cent. what it was a year ago.

NEW YORK

No abatement in demand for anthracite domestic sizes. Report that Fuel Administrator Wiggins is to resign, and coalmen want practical coal man appointed. New England wants coal. Local retail dealers swamped with orders. Bituminous situation easier, but free coals are scarce. Bunker coals in greater demand.

Anthracite—There has been no abatement in the demand for coal. Although produc-

tion figures show an increase over the previous week, receipts are insufficient to take care of the call for supplies. Reports of labor conditions at the mines indicate that they are becoming serious, and that in addition to the men going to war many are going into other industries.

A rumor that Albert H. Wiggins is to resign as state fuel administrator resulted in a telegram being sent to Dr. Garfield by the Wholesale Coal Trade Association of this city stating that the directors of that body request the appointment of a practical coal man as his successor should Mr. Wiggins resign. The telegram stated that in view of a possibility of a coal famine this year, the situation in New York under the circumstances demands calling into service a man who has a thorough knowledge not only of the requirements of this community and the territory depending upon it for its coal supply, but one who shall know thoroughly the producing district from which the supply must necessarily be drawn.

Shipments of anthracite during the week ended Apr. 27 were 39,522 cars as compared with 39,130 cars the week previous, an increase of 392 cars; while dumpings at the New York tidewater docks for the week ended May 4 amounted to 7303 cars as compared with 7286 cars for the previous week, an increase of 17 cars.

New England continues to call for coal, and the local shippers are being urged to send shipments forward. It is claimed that receipts so far this year are far below normal requirements, and unless shipments are speeded up at once the shortage next winter will be as bad as, if not worse than, it was last winter.

In New York City dealers are swamped with orders, the consumers having taken the advice of the Fuel Administration. There is hardly a day that some yard is not without coal. Egg and stove are in greatest demand. Most retail dealers have chestnut and pea, but more of the first-named coals are used by household consumers, hence the heavy demand.

The steam sizes are easier. Buckwheat No. 1 is easy, but not in oversupply. Rice and barley are more plentiful with quotations in some quarters slightly lower than a week ago. Wherever possible barley is being stored by consumers.

Contracts have been awarded for supplying the school buildings in Manhattan and the Bronx with coal for one year, but as no bids were received for furnishing fuel to the buildings in the other boroughs of the Greater City an agreement has been reached which provides that the schools will be kept in coal.

Current quotations, per gross ton, f.o.b., Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken.....	\$6.15	\$6.90
Egg.....	6.05	6.80
Stove.....	6.30	7.05
Chestnut.....	6.40	7.15
Pea.....	4.90	5.65
Buck.....	4.45@5.15	4.80@5.50
Rice.....	3.90@4.10	4.80@4.50
Barley.....	3.40@3.65	3.00@4.00
Boiler.....	3.65@3.90	

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight rates.

Bituminous—Market conditions are more encouraging. With an improvement in car supply reports from the mines indicate heavier production and a better feeling among the mine workers. The increased production for the week ended Apr. 27 is reflected in the dumpings at the New York tidewater ports for the week ended May 4, when 6565 cars were dumped as compared with 6070 cars the previous week. However, the increased dumpings did not add materially to the available quantity of free coal, which is at a minimum here.

Receipts here are barely able to take care of the needs of regular customers which, in many instances, continue to be nearly up to full winter requirements notwithstanding the higher temperatures.

Operators are optimistic, however, of the future and believe that with a more equitable distribution of cars there would be a surplus of coal. They also point out that while many of the miners are now disgruntled because of the small number of cars furnished by the railroads and are threatening to seek employment elsewhere, they would willingly remain at the mines if they could be assured of steadier employment.

A slight improvement in cars is reported by operators along the Baltimore & Ohio where last month some of the mines received about 40 per cent. of their requirements. Some operators along this road have contracts for railroad fuel which do not expire until July 1.

Some change for the better may be expected because of the cancellation of the Fuel Administration's order of last winter diverting certain shipments to New England. In the cancellation order, which took effect May 8, it is stated that the order is not now necessary because of the zoning system.

The shortage of fuel in New England is serious according to reports received here, and not much hope is held out unless more coal is sent to the Southern ports for transshipment, even though the United States Shipping Board shall provide more bottoms.

The demand for bunker fuel is heavy owing to the limited number of pools from which these coals must be taken.

BITUMINOUS PRICES

	F. o. b. New York Price	Mine Gross	Net	Gross
Central Pennsylvania.....	\$5.06	\$3.05		\$3.41
Maryland:				
Mine-run.....	4.84	2.85		3.19
Prepared.....	5.06	3.05		3.41
Screenings.....	4.50	2.55		2.85

PHILADELPHIA

Anthracite trade unduly stirred by newspaper reports. Shipments unimproved. Local committee labors to secure heavier receipts. Retailers cautioned against soliciting new trade. Misunderstanding as to distribution. Shipments of buckwheat coal forbidden until exemptions are granted. Bituminous trade unchanged. Situation continues serious. Future unpromising. Assigned cars continued.

Anthracite—All retail men are swamped with orders, and some of them have oversold their quota as based on shipments to them during the period of the present allotment—April, 1916, to March, 1917, inclusive. Published accounts anticipating another scarcity next winter have made the public more anxious than ever to stock their cellars, and the dealers have been tormented with insistent demands for prompt deliveries. The shipments show little improvement, and as coal is usually delivered by the dealers as rapidly as received, there is very little coal in the yards. It would appear that the dealers who depend on the smaller operators for the bulk of their supply are receiving a larger proportion of their requirements than those who are supplied by the companies.

The entire trade is hopefully awaiting the result of the local fuel administration's efforts to secure heavier shipments for them. Chairman Lewis has been busy compiling figures showing shipments, deliveries, stocks on hand, as well as orders unfilled. The dealers have been assured of his earnest efforts in their behalf to secure more coal for this territory within the next 60 days.

The fuel committee somewhat surprised the retailers by giving them written notice to use due caution not to solicit orders for new trade beyond their reasonable expectation of ability to fill such orders. The consumer was also warned that in placing his order with other than the regular dealer he risks not being supplied with coal, for the reason that the fuel administration's efforts to secure a proper allotment of coal for the city are based on each dealer's tonnage of former years. The dealers, however, have been directed to supply newcomers in their immediate neighborhood, irrespective of the fact whether they have been former customers.

This week the producing companies were somewhat startled by a drastic order handed down by the National Fuel Administration directing that they discontinue shipping at once all buckwheat to manufacturing plants until these plants secured permits from Washington. There were a few exemptions to this order, which were based on the exemption clause of the Garfield closing order under date of Jan. 17 last. The trade is entirely in the dark as to the reason for this order, and as a matter of fact up to the end of the week some of the shippers claim not to have received the instructions. There is no doubt of the issuance of the order, as your correspondent has seen the circular letter sent out. The suddenness of the ruling had a tendency to disrupt some shippers, especially those without storage room. As the order allowed the selling of buckwheat to retail dealers for domestic trade, several shippers availed themselves of this opportunity. In the meantime consumers succeeded in securing exemptions from the national administration and shipments are assuming a normal trend again. The operators are in the dark as to the cause for the move, and at first felt that possibly the Government intended to take the coal for some special use, but as they have not done so it begins to look as if the purpose of the

order was to have their hand directly on the distribution of steam coal.

Another order that stirred certain anthracite shippers was sent out by the national anthracite distribution committee. This had particular reference to the producers and distributors of anthracite coal who have changed their selling agencies during the coal year 1916-17, and directed that these concerns must place their output in the same communities which received coal from these mines in the coal year beginning Apr. 1, 1916. The letter stated that unless this was done the output of such operations would be considered as "liquid" coal and the distribution directed by the above committee. It will be recalled that there were several changes of this nature during the above-named period, whether either by sale or expiration of lease, the selling agencies had been changed, the most notable being wherein the Pennsylvania R.R. disposed of its anthracite interests held through the Susquehanna Coal Co.

The prices per gross ton f.o.b. cars for line shipments and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken.....	\$4.90	\$6.05	Buckwheat.....	\$3.15	\$3.75
Egg.....	4.50	5.70	Rice.....	2.65	3.65
Stove.....	4.75	6.05	Boiler.....	2.45	3.55
Nut.....	4.85	6.10	Barley.....	2.15	2.40
Pea.....	3.45	4.35			

Bituminous—Conditions do not improve and have really shown very little variation for the past two months. Every operator continues to clamor for more cars and then some more. Short working time is yet the rule at numerous mines, yet all the while promise is made that rail conditions will improve so as to relieve the situation. Locally the important plants, such as public utilities and concerns on war material, continue to be fairly supplied, while other less essential industries are curtailed. Shippers continue to complain that the practice of assigning cars is not yet entirely eliminated.

BALTIMORE

Coal supply here largely at the mercy of diversions. City served in rather haphazard fashion with industrial fuels. Hard coal receipts comparatively light.

Bituminous—"About 300 cars of coal are being diverted to Baltimore district." That was the message of hope that came to the trade and business here after a week of scarcity caused by railroad congestion that prevented coal directly consigned from coming through. This coal is being distributed here at present, supplemented by directly consigned coal that had edged its way past the jam at the Cumberland gateway. For several days there was a glowing example of the fact that the Baltimore & Ohio and Western Maryland Ry. were unable to care for their coal delivery obligations in this territory without attempting to supplement the extra amount cut off from this section by the embargoing of the Pennsylvania deliveries. The 15,000 or so tons diverted here from their original northern destinations not only aided in preventing shortage among consumers, but assisted in clearing a part of the railroad congestion to the westward of this point.

Anthracite—Hard coal dealers here report that the summer weather has brought a lessened urgent call for hard coal. Coal men are rather glad of a let-up in demand for immediate deliveries, because the receipts of anthracite are comparatively light. Constant urging by Fuel Administration officials, supplemented by announcements here by the Maryland fuel administrator that people should put in their supplies up to two-thirds of requirements at once, had caused more of a rush for immediate delivery than the coal men could supply. Now the lull will allow a catching up. Few of the coal men are figuring that they are to secure enough hard coal over summer to enter the fall term with even the two-thirds supply in the bins of their household customers.

Lake Markets

PITTSBURGH

Car supplies slightly improved. Lake shipments light. Little coal for stocking purposes.

There has been a slight further improvement in car supplies, and the Pittsburgh district is now working fairly well, although not up to capacity by any means.

Conditions are better than 30 days ago, when the Geological Survey report showed 27.8 per cent. of the capacity idle on account of car shortage. As to the Pittsburgh and Connellsville districts generally, however, conditions were not as good even as shown by that report, which covered western Pennsylvania as a whole. The Panhandle division has been particularly short of coal cars right along, while the Connellsville district shippers have been very short. The railroads have endeavored to place coke cars first in that region, and coal cars next, and even the coke cars have been quite below requirements. Numerous exceptions, however, are made in the case of byproduct coke. The difference between coal and coke car supplies is shown by the report, for the week ended Apr. 27, by certain coke producers in the Connellsville, Greensburg and Latrobe districts. Their coke car shortages represented 8.6 per cent. of their capacity, while their coal car shortages represented 18.8 per cent. of capacity. Their mine labor shortage was reported very high in the case of coal, presumably because they figured their mining labor full as to coal destined for their beehive ovens and allotted only the remaining labor to their raw coal business.

Lake shipments have increased a trifle, but are still very light, and the movement is not expected to be on in full for several weeks yet, or until the vessel movement is in full swing.

Coal consumers are fairly well supplied for current needs, but are obtaining little coal to accumulate stocks, as the authorities are so anxious that they should do at this time. There is little free coal in the market. Prices remain quotable at the Government limits: Slack, \$2.20; mine-run, \$2.45; screened, \$2.70, per net ton at mine, Pittsburgh district, with 15c. brokerage allowed to be charged extra under certain conditions.

BUFFALO

Plenty of bituminous in consumers' hands, especially in Canada, but clamor for anthracite is as general as ever. Shippers do not see any real excuse for so much fright over the anthracite situation.

Bituminous—The jobbers as a rule do not find it easy to fill their orders and they are groping along as best they can between the operators, who have no real need of them, and the consumers, who give them business sparingly. All reports from Canada agree that the territory covered from Buffalo by rail is full of bituminous coal, so that the sellers have paid large demurrage charges. Some of them are still with coal on track that there is no demand for. A great part of this coal is of poor quality. It would not sell here, and all that could be done with it was to send it on till it reached the end of the line. There it stuck and there much of it will remain unsold awhile yet.

The chief reason for the Canadian situation is that a margin of 30c. profit is allowed there, while only 15c. can be realized here. Some of this poor coal has been taken by the railroads, but even they cannot well absorb all of it. So the paying of demurrage must go on awhile yet. It is said that as soon as the water coal destined for the St. Lawrence valley trade by shippers from Ohio ports gets well started the situation there will be much the same that it is now in the district further west in Canada.

Bituminous prices are still pretty low, so that the consumer has the Fuel Administration to thank for that at least, being \$4.45 for thin-vein Allegheny Valley, \$4.25 for Pittsburgh lump, \$4 for mine-run and \$3.75 for slack, all per net ton, f.o.b. Buffalo.

Anthracite—The actual scarcity of this coal is not very great, for the shippers say that they have distributed as much this season as they did last season to date. Some claim that they have done more than that, so far as the city is concerned, but that is not easily determined. At any rate the consumers are not at all satisfied and are making all possible effort to get more. The rule not to furnish any coal except on written order accompanied by a statement of the needs and the amount on hand is strictly adhered to, but the retailers find that if they get any amount to handle they must be at the trestles very early in the morning, for the supply usually gives out before noon. Some days the trestles get none, and never do they get enough to keep the deliveries busy.

Whether this proceeding is going to be such that the actual needs are met before winter is hard to say, for it will require a house-to-house inspection to find how much the consumers have on hand. They will

not make that known if they can help it. All will buy much more than they need if they can get it. Shippers are advising everybody to use as much wood as they can for fuel, and it is expected that a large amount of bituminous coal will be burned in homes next winter, especially where the anthracite supply is most uncertain.

The lake season opens slowly, with only a part of the shippers supplied with coal for that trade. The amount loaded so far is 69,000 tons for Chicago and 20,400 tons for Milwaukee in April, and 18,000 tons for Chicago, 10,000 tons for Duluth-Superior and 13,500 tons for Milwaukee so far in May. Rates are 48c. per net ton to Duluth, 55c. to Milwaukee and 65c. to Chicago.

DETROIT

Receipts of bituminous are materially reduced. Anthracite is scarce. Lake shipments are of good volume.

Bituminous—Shipments of bituminous coal coming into Michigan are lighter than a month ago. Traffic records show the movement of 27,434 cars into the state between Apr. 1 and Apr. 28, of which 24,315 were bituminous and 3,119 anthracite. Detroit's average daily receipts during this period were 395 cars of bituminous and 69 cars of anthracite. Estimates on local consumption requirements call for a daily supply of all kinds of coal, amounting to about 700 cars. Further reduction of the volume of bituminous coal shipments is developing with the opening of navigation season on the lakes. This curtailment is the result both of demands on the mines for lake coal and of a shortening of transportation equipment, resulting from the diversion of cars and locomotives from all rail routes to those over which the coal is hauled to lake loading docks.

The local situation is made more complicated as the result of a clash between W. K. Prudden, Michigan fuel administrator, as opposed to the Wayne County fuel commissioners and Detroit coal dealers. After allowing Detroit dealers a margin of \$2.50 a ton for deliveries of domestic coal made during the summer months, Mr. Prudden has become something of a storm center. Detroit dealers assert it is impossible for them to handle domestic coal at the margin allowed and make a profit. They say that rather than continue business at a loss, they will close their yards. The Wayne County fuel commissioners, Edgar B. Whitcomb, chairman, James Couzens and Charles A. Dean, support the Detroit dealers' contention, though they were unable to agree among themselves what would be a just margin. Mr. Couzens suggested \$2.60 a ton, Mr. Dean desired \$2.75, and Mr. Whitcomb thought \$3 necessary.

Owing to the differences, coal distribution to Detroit consumers of domestic stock have been much restricted, and time which should have been utilized in stocking up household consumers has seen little progress in that direction from the Detroit Board of Commerce, which also is endeavoring to obtain from the Federal Fuel Administration a modification of the zone system that will give Detroit a larger supply of West Virginia coal, as a substitute for Pocahontas and New River coals, neither of which is now supplied the Detroit market.

Anthracite—Incoming shipments of anthracite have been so scanty that the receipts of retail dealers have been scarcely more than sufficient to supply current needs of their customers. The state fuel administrator says an allotment of anthracite will soon be made to Detroit. Meantime the opportunity to put in stocks required by household consumers for next winter is being lost.

Lake Trade—Shipments over the lake routes is proceeding in considerable volume, though the movement from the mines to the leading docks has diminished. Cargoes are not available for all the carriers offered and as the ore movement is not yet of much volume, ships are being detained at the ports to await the arrival of coal from the mines. Little anthracite coal has been loaded to date.

COLUMBUS

The coal trade has shown more strength during the past week. Lake trade is increasing, and has had the effect of absorbing all tonnage. Steam business is rather more active than previously.

The coal trade in central Ohio territory has been rather strong in every department during the past week. This is especially true of domestic and lake tonnage, which has been snapped up rapidly. Steam busi-

ness continues to show considerable strength, as mine-run is not as plentiful as formerly. Taking it all in all, the trade is in good shape and future prospects are for continued activity.

Domestic trade is still attracting the bulk of the attention of producers, jobbers and fuel administrators. The warnings recently issued to householders to lay in their fuel supply have met with prompt response, with the result that dealers in every section are active. With Pocahontas and West Virginia splints arriving on the local market in larger quantities, many private users who have been holding back for the fancy grades are now placing orders. Retailers are busy making deliveries, and all available trucks and teams are employed. Retail stocks are not so large as formerly, as many have been using from their surplus. Retail prices continue firm at the levels which have prevailed for some time. Anthracite is quite scarce on the local market.

The steam business is rather active, as some of the larger users are stocking up to a large degree. Uncertainty as to price fluctuations is now about over, and consequently some of the larger consumers who have been holding back are placing orders. Most of the steam orders are for immediate shipment. Railroads are taking coal for current needs only, as many have large surplus stocks on hand. The smaller consumer of steam varieties is not stocking, being content to buy in the open market. On the whole the steam trade is more active than formerly.

Lake trade is becoming more important as the season advances. This is especially true as it affects coal produced in Ohio and West Virginia. A considerable tonnage is moving to the lower lake ports and vessels are being loaded. Ice in the upper lake channels is still interfering with the free movement, but this is expected to pass away in the near future. Loadings at the docks of the lower lake ports are growing larger.

Production is better since the car supply has been improved. This is especially true of the Hocking Valley, where the output is close to 80 per cent. The fact that May 1 was kept as a holiday reduced the output to a certain extent. In eastern Ohio operators are still worried by a rather short car supply.

CINCINNATI

Improved car supply has helped the situation, but supply remains below demand. Storage orders are on an unprecedented basis.

Reports from the various nearby coal-mining districts indicate that in most cases a better car supply is being received, the average probably running as high as 75 per cent. of requirements. As this is much better than has been the case for some months, the volume of coal loaded and forwarded is also larger than for some time. So far, however, actual receipts have not been such as to run much ahead of the orders actually in the hands of dealers, although it is understood that such orders are to be filled from time to time during the spring and summer, as supplies of coal become available. This is especially true of domestic consumers, thousands of whom have placed with their dealers orders covering their entire winter's supply, to be cared for as the dealers may find convenient. Large industrial consumers are also placing orders in advance of current requirements, in order that they may accumulate substantial reserves for next winter, in line with the advice of the trade and of the Fuel Administration. These orders explain the heavy demand for coal, and will go far toward taking care of all that can be shipped to this market during the warm weather.

LOUISVILLE

Good weather conditions lead to smaller domestic demand for immediate use. Domestic stocking demand good. Steam buyers signing up contracts freely.

Mild weather since the latter part of April has resulted in a much lighter demand from the retailers, except in that large domestic consumers are placing heavy stocking orders. Indications are that winter will find more coal stored by domestic consumers than even the Fuel Administration had anticipated, according to some of the local coal men. The steam demand is also good, but is principally on contract orders.

The situation at the eastern and western Kentucky mines shows little if any improvement, the car supply still being short, while labor is scarce and steadily growing scarcer. However, indications are that none of the mines will have to close down this summer during the dull period, as has been the case with some of the smaller mines in past years. It is believed that it will be

easier to hold labor, as operations will be controlled almost entirely by the car supply.

So far local retailers have not made much headway toward piling up any yard stocks, as the domestic demand is strong enough to keep the yards fairly well cleaned up. Some little western Kentucky coal has been looking for an open market, but as a whole the supply is well taken care of.

BIRMINGHAM

Increasing priority demands bringing about an embarrassing condition in the trade. Nonessential industries are feeling the pinch of a short and uncertain supply. Domestic receipts continue unsatisfactory in volume. Mine capacity not being obtained, due to slack working schedules principally.

Coal producers in this field are now complying with Government instructions to supply industries and other classes of steam users certified as being essential to the welfare of the nation with 100 per cent. of their requirements, or with such a proportion thereof as possible, before turning their attention to the nonessential consumers. As a result, the fuel question with the latter class is becoming more and more serious. The Southern Ry. made a substantial increase in its demands upon the mines on its system the past week, and it is understood that its tonnage requirements from such operations for the current week will be based on 47 per cent. of the production. This and other interferences with the normal movement of coal to regular customers is causing much confusion in the trade and embarrassment to consumers not in the preferential class. Free coal is indeed scarce, and the majority of the available tonnage is of an inferior grade.

Complaint is made that domestic receipts are very unsatisfactory and uncertain. Hardly any local yards have made any progress in stocking—some are kept clean by deliveries on current orders. Retail prices will be boosted 45c. per ton May 16. It is understood, though the local fuel board has not yet announced the increase. This amount will be added to the mine prices when the new wage scale and agreement is put into effect by the commercial operators. Furnace companies will receive little or no benefit from the increased mine price, as they have a limited tonnage for the market.

Much relief could be afforded the situation by an increased production. However, mine labor continues to manifest indifference. Comment is general that, although there is some labor shortage, many operations have full working forces and such mines are falling far short of capacity output. The Miners' Union ratified the recent wage agreement at their convention last week, but such action is not expected to boost production, in the light of past experiences.

Coke

CONNELLSVILLE

Slight increase in shipments. Labor shortage more in evidence. Prospective influence of four new byproduct plants.

There has been a slight gain in Connells-ville coke shipments, but the movement is still not altogether adequate. With long range comparisons, the blast furnaces are distinctly better supplied than 30 days ago, and of course vastly better than in January or February; but there is still considerable lack of coke. In the first place, many of the furnaces, particularly merchant stacks, are running at gaited rates, being unable to operate full, and in the second place there are a number of idle furnaces which it is desired to blow in. Very rarely are any furnaces banked nowadays, but this does not show that production is up to the available capacity, by any means.

Labor shortage is somewhat more in evidence, partly by reason of the change of season, whereby some men are attracted to other employments, and partly by reason that with somewhat better car supplies there are more jobs. Undoubtedly the irregular operation of the past few months has induced some men to seek steadier employment. Their wages at the coke works are very high, at scale rates, but practically all the work is piece work.

A decided change in the situation as to coke supply is in near prospect, by reason of several byproduct coke operations nearing completion. The 180-oven plant at Cleveland of the American Steel and Wire Co. is expected to make its first coke this week. The Lorain plant of the National

Tube Co., 208 ovens, and the Clairton plant of the Carnegie Steel Co., 640 ovens, are expected to begin making coke late next month. All three plants should be running at capacity within a couple of months after making their first coke, making easily 75,000 tons of coke a week, and the shortage of Connellsville coke has hardly amounted to more than that in the past two months. The coke will, of course, go only to Steel Corporation blast furnaces, and much of the coal must come from the Connellsville region, but the Clairton coal will move by river exclusively, thus relieving the railroads to that extent at any rate. The Solvay plant in the Ironton district, 40 ovens, is expected to be operating some time next month. It has made a number of ten-year coke contracts with merchant blast furnaces in the Ironton district. That district has been suffering particularly from coke shortage for a year or more.

Very little free coke appears in the market. Market prices remain at the Government limits: Furnace, \$6; 72-hour selected foundry, \$7; crushed, over 1-in., \$7.30, per net ton, at ovens.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended Apr. 27 at 343,865 tons, an increase of 6989 tons. Owing to incomplete returns shipments were not reported, except that river shipments were 17,620 tons, against 10,500 tons the preceding week.

Buffalo—The reports from the coke districts agree that it is difficult to get cars, especially for moving the coal from the mines to the ovens. So far as can be learned the furnaces in this district are getting coke enough to keep them running, but it is with much difficulty. Much doubt is expressed of the ability to do this were it not for the byproduct plants here, which not only provide the supply of their own concerns, but also sell considerable to the other furnaces, which are dependent on outside production. Prices are on Government basis, with \$2 freight added.

Wane Chicago is a dumping-ground for anything that looks like coal, some grades of Illinois and Indiana have not brought the full Government price. Screenings have sold off 15c. per ton. This 15c. was given on account of labor shortage. Friday and Saturday the market stiffened on fine coal and no off sales have been reported.

One of the gratifying results of the "buy your coal now" campaign is that users have fully satisfied themselves that it will be impossible to get eastern bituminous and that they must use either Illinois or Indiana; hence they are fast falling in line with their storage orders. Hard coal continues to move slowly, although there is some improvement over the previous week.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Williamson and Franklin	Saline and Harrisburg	Fulton and Peoria	Springfield	Cartersville	Grundy, La. Salle, Bureau and Will
Steam lump.....	\$2.65@2.80	\$2.65@2.80	\$3.05@3.20	\$2.65@2.80	\$2.65@2.80	\$3.35@3.50
Domestic lump.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Egg or furnace.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Small egg or nut.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Stove.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Chestnut.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Pea.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Washed egg.....	2.85@3.00				2.85@3.00	3.35@3.50
Washed stove.....	2.85@3.00				2.85@3.00	3.35@3.50
Washed nut.....	2.85@3.00				2.85@3.00	3.35@3.50
Mine-run.....	2.45@2.60	2.45@2.60	2.85@3.00	2.45@2.60	2.45@2.60	3.10@3.25
Screenings, over 1 in.....	2.20@2.35	2.20@2.35	2.45@2.60	2.20@2.35	2.20@2.35	2.85@3.00
Washed slack.....	2.15@2.30	2.15@2.30	2.50@2.65	2.50@2.65	2.15@2.30	2.85@3.00

	Clinton and Sullivan	Knox and Greene	Eastern Kentucky
Domestic lump.....	\$2.65@2.80	\$2.65@2.80	3.10@3.25
Steam lump.....	2.65@2.80	2.65@2.80	3.10@3.25
Egg.....	2.65@2.80	2.65@2.80	3.10@3.25
Small egg or nut.....	2.65@3.00	2.65@2.80	3.10@3.25
Mine-run.....	2.40@2.55	2.40@2.55	2.85@3.00
Screenings.....	2.15@2.30	2.15@2.30	2.60@2.75

MILWAUKEE

Docks again busy receiving coal. Seventeen cargoes arrive in one week. Deliveries of the new supply of anthracite now being made. Hard coal to be 30c. lower than last season.

Lake traffic is in full swing again and coal cargoes are arriving daily, the first of the season having been received on Apr. 30. Up to and including May 6, 17 cargoes aggregating 130,747 tons, were docked. Of this amount 27,236 tons were hard coal. A more even flow of receipts is expected this season. Last year the movement was very irregular. Capt. W. C. Richardson, of Cleveland, a member of the mobilization committee, was on hand when the first cargo arrived. Because of the strike at the Escanaba ore docks, he ordered three vessels with capacity amounting to 27,700 tons, to proceed light to Lake Erie for coal.

Reports from 29 Wisconsin counties to the state fuel administration office are in effect that wood cutting is being prosecuted on a scale never before known, the increase ranging all the way from 25 to 400 per cent. Special Fuel Assistant Sneed suggests that Milwaukee put in a supply to meet an emergency.

As a measure of conservation, Fuel Administrator Fitzgerald has issued an order limiting florists to 50 per cent. of their normal supply of coal. The business will be crippled, but the authorities hold that it is not necessary to the life and comfort of the American people.

The Wisconsin Railroad Commission has requested Federal Fuel Administrator Garfield to conduct a thorough examination into the cost of handling coal on the docks. The action was taken at the instance of Wisconsin public utility operators, following permission to them to increase their rates on account of the increased cost of coal.

The city fuel stations have been closed for the season. A total of 1,500,000 lb. or 825 tons, was sold at 1/2c. per pound. The matter of their reopening will depend upon circumstances.

ST. LOUIS

General conditions show considerable improvement and future prospects unusually good. Cartersville is entirely oversold, and the market is beginning to tighten on everything excepting steam coal. Shortage of equipment continues and transportation is slow. Shortage of labor general. Small anthracite shipments and of poor quality.

The local situation is unusually good. Conditions in the past week have entirely changed, and it is almost impossible now to buy Cartersville coal. The same may be

said of DuQuoin coal. To begin with, there is a shortage of cars in the Cartersville field, and the mines are not working regularly. Added to this is the fact that the tonnage of nearly all mines seems to be decreasing on account of labor shortage.

The general prosperity has brought about a desire on the part of the consumer to buy the best coal obtainable, with the result that the demand for Cartersville is so far ahead of the available supply that nearly every mine in the Cartersville field is sold up to the first of July, figuring on the present car supply.

In the DuQuoin field the car supply is short, and conditions are somewhat similar to those in the Cartersville field. The Mt. Olive situation is fairly good. Car supply is better here than in the other fields, and the mines are working better time, with a

better labor supply, although transportation is somewhat slow. This accounts in one way for the shortage of cars in the Cartersville and DuQuoin field, inasmuch as the railroads are not moving some of their equipment as well now as they did under the adverse winter conditions. The demand for the Mt. Olive grade is exceptionally good locally.

In the Standard field the situation continues to improve, and while coal is being sold under the Government maximum price, indications are that this will not continue long. There have been instances in the past week where 2-in. lump has sold as low as \$2.35 and 6-in. lump as low as \$2.50. The car supply in this field on some roads is fairly good, but on the Illinois Central and Missouri & Ohio it is extremely bad.

The reconsigning restrictions also have a tendency to retard the equal distribution of coal, and this in itself has prevented a large tonnage of coal moving to places where it is needed.

The railroads have begun to buy. During the past week something like 1000 to 1500 cars of coal have been bought on the open market, with prices ranging from \$2 to \$2.15 for mine-run, depending on the period of shipment. They furnish their own cars.

The steam condition from all the fields is extremely poor. Cartersville screenings are down to \$2, and screenings from the DuQuoin field have gone as low as \$1.75, while Standard screenings have been down to \$1.40; and rumor has it that a lot of Standard screenings were sold in Chicago for the freight and demurrage.

There is little Arkansas coal coming in, and such small tonnage of anthracite as comes in from the east is off grade and off size and is not good coal.

While the market is off a little in a general way, quotations are the Government maximum, which is as follows:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump.....	\$2.65@3.00	\$2.65@2.80	\$2.65@2.80
3x6-in. egg.....	2.65@3.00	2.65@2.80	2.65@2.80
2x3-in. nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 2 nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 3 nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 4 nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 5 nut.....	2.15@2.40	2.15@2.40	2.15@2.40
2-in. scrags.....	2.15@2.40	2.15@2.40	2.15@2.40
2-in. lump.....			2.25@2.50
3-in. lump.....	2.50@2.65		
Steam egg.....	2.35@2.50	2.25@2.40	2.25@2.40
Mine run.....	2.45@2.60	2.45@2.60	2.45@2.60

	Washed:		
No. 1.....	2.65@3.00	2.65@3.00	2.65@3.00
No. 2.....	2.65@3.00	2.65@3.00	2.65@3.00
No. 3.....	2.65@3.00	2.65@3.00	2.65@3.00
No. 4.....	2.65@3.00	2.65@3.00	2.65@3.00
No. 5.....	2.15@2.30	2.15@2.30	2.15@2.30

Middle Western

GENERAL REVIEW

Shortage of equipment limits the storing of any great amount of coal regardless of the willingness of the public to put in large stocks.

Large storage orders have been placed with producing companies, but the limited car supply has prevented any great tonnage movement. At the solicitation of the Fuel Administration and operators the consumers have, in many instances, begun taking all the coal available, not only to provide sufficient fuel for immediate needs, but to make an earnest effort to create a surplus for future contingencies. So far the good intentions of consumers have not met with any measurable success, because of the failure of the railroads to provide a sufficient car supply. In few cases has the supply of cars been sufficient to give the mines more than 80 per cent. working time, and reports from some of the mines state they have not worked to 50 per cent. of capacity. During the past week the railroads have been buying considerable tonnage; in fact they have absorbed all the surplus sized coal, which has caused some worry with regard to finer grades. This is true in the Springfield and Fulton County districts, where there is a considerable amount of screenings unloaded at the mines. When the new zone plan went into effect there were some substantial contracts on screenings for movement to Kansas City, Mo. The cutting off of this market seriously affected the central Illinois fine coal market, as the movement had been of long standing, and necessitated the finding of another market.

Market conditions on high-grade Illinois and Indiana size coal are excellent, although some difficulty is reported in moving coal at the Government price from the inner-group territory.

The movement of anthracite into the Middle West has not anywhere come up to expectations, dealers claiming that this is due to the heavy eastern demand, which is having the first call.

CHICAGO

Railroad congestion continues to be embarrassing to the Chicago coal men.

The solution of the coal situation was again put up to the railroads this past week. The storage demand has suddenly become strong, and it is needless to say the mines will have all they can do provided they can at all times have a full car supply.

CURRENT PRICES—MATERIALS & SUPPLIES

IRON AND STEEL

PIG IRON—Below are the present quotations, with a comparison of a month and a year ago:

	Current	One Month Ago	One Year Ago
CINCINNATI			
No. 2 Southern foundry.....	\$35.90	\$35.00	\$37.90
No. 2 Northern foundry.....	33.26	34.26	.....
NEW YORK †			
No. 2 X Northern foundry....	34.25	34.25	41.50
No. 2 plain Northern foundry	33.75	33.75	.....
No. 2 Southern foundry.....	39.00	38.75	.....
BIRMINGHAM			
No. 2 Southern foundry.....	33.00	33.00	35.00
CHICAGO			
No. 2 Northern foundry.....	33.00	33.00	41.00
No. 2 Southern foundry.....	37.00	37.00	.....
PITTSBURGH			
Bessemer iron *.....	36.15	37.25	42.95
Basic iron *.....	32.00	33.95	40.00

* These prices include the freight charge from the valley to the Pittsburgh district. † Delivered Tidewater, New York.

STRUCTURAL MATERIAL—The following are the base prices, f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill, Pittsburgh	Current	1 Year Ago	St. Louis	Chicago
Beams, 3 to 15 in.....	\$3.00	\$4.195	\$4.75	\$4.27	\$4.20
Channels, 3 to 15 in.....	3.00	4.195	4.75	4.27	4.20
Angles, 3 to 6 in., ½ in. thick.....	3.00	4.195	4.75	4.27	4.20
Tees, 3 in. and larger.....	3.05	4.245	4.80	4.27	4.25
Plates.....	3.225	4.45	6.50	4.52	4.45

BAR IRON—Prices in cents per pound at cities named are as follows:

	Pittsburgh	St. Louis	Denver	Birmingham
Apr. 1, 1918.....	3.50	4.17	4.05	4.38

NAILS—Prices per keg from warehouse in cities named:

	Mill, Pittsburgh	St. Louis	Denver	Chicago	Birmingham	San Francisco	Dallas
Wire.....	\$3.50	\$4.30	\$4.85	\$4.25	\$4.25	\$4.80	\$4.75
Cut.....	3.75	5.25	4.85	4.40	4.25	6.40	.....

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Current	Cincinnati	Chicago	St. Louis	San Francisco	Birmingham	Denver
Standard railroad spikes ½-in. and larger.....	\$3.90	\$6.00	\$4.50	\$5.30	\$6.25	\$5.30	\$5.00
Track bolts.....	4.90	8.90	5.50	Pre-mium	7.45	6.75	6.00
Standard section angle bars.....	3.25	.....	4.45	.....	4.90	.....	4.30

COLD DRAWN STEEL SHAFTING—From warehouse to consumers requiring fair-sized lots, the following discounts hold:

	Cincinnati	Cleveland	Chicago	St. Louis	Denver	Birmingham
17½% List	+10%	+10%	+10%	+35%	+20%	.....

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill, Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight.....	\$5.25	\$6.50	\$6.50	\$6.25	\$7.50	\$6.50
Assorted.....	5.40	6.50	6.50-7.00	6.40	7.75	6.75

Cincinnati—Horseshoe nails sell for \$4.50 to \$5 per 25-lb. box

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	Current	1-Month Ago	One Year Ago	Chicago	St. Louis	San Francisco	Dallas
4 in.....	\$58.35	\$58.35	\$58.00	\$57.55	\$57.00	\$65.00	\$61.00
6 in. and over.....	55.35	55.35	55.50	54.55	54.00	62.00	58.00

Gas pipe and 16-ft. lengths are \$1 per ton extra.

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	Current	One Year Ago	Current	One Year Ago
Standard Bessemer rails.....	\$65.00	\$38.00	\$65.00	\$38.00
Standard openhearth rails.....	67.00	40.00	67.00	40.00
Light rails, 8 to 10 lb.....	*3.135 (100 lb.)	58.00	*3.135 (100 lb.)	53.00
Light rails, 12 to 14 lb.....	*3.09 (100 lb.)	57.00	*3.09 (100 lb.)	54.00
Light rails, 25 to 45 lb.....	*3.00 (100 lb.)	53.00	*3.00 (100 lb.)	52.00

* Government price per 100 lb.

OLD MATERIAL—The prices following are per gross ton paid to dealers and producers in New York. In Chicago and St. Louis the quotations are per net ton and cover delivery at the buyer's works, including freight transfer charges:

	New York	Chicago	St. Louis
No. 1 railroad wrought.....	\$31.50	\$30.25	\$35.00
Stove plate.....	25.00	22.25	20.00
No. 1 machinery cast.....	34.00	26.50	21.50
Machine shop turnings.....	15.25	15.50	20.00
Cast borings.....	15.25	15.25	19.00
Railroad malleable cast.....	34.00	27.00	25.50

COAL BIT STEEL—Warehouse price per pound is as follows:

	New York	Cincinnati	Birmingham	St. Louis	Denver
	\$0.12	\$0.16½	\$0.18	\$0.18	\$0.17

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham
Solid.....	15c.	14c.	15c.
Hollow.....	24c.	25c.	.....

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh; basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

BUTT WELD

Inches	Steel Black	Galvanized	Inches	Iron Black	Galvanized
1, 1½ and 2.....	44%	17%	1 to 1½.....	33%	17%
2½ to 3.....	48%	33½%	.....	.....	.....
3 to 3½.....	51%	37½%	.....	.....	.....

LAP WELD

2.....	44%	31½%	2.....	26%	12%
2½ to 6.....	47%	34½%	2½ to 4.....	28%	15%
.....	.....	.....	4½ to 6.....	28%	15%

BUTT WELD. EXTRA STRONG PLAIN ENDS

1, 1½ and 2.....	40%	22½%	1 to 1½.....	33%	18%
2½ to 3.....	45%	36½%	.....	.....	.....
3 to 3½.....	49%	36½%	.....	.....	.....

LAP WELD. EXTRA STRONG PLAIN ENDS

2.....	42%	30½%	2.....	27%	14%
2½ to 4.....	45%	33½%	2½ to 4.....	29%	17%
4½ to 6.....	44%	32½%	4½ to 6.....	28%	16%

From warehouses at the places named the following discounts hold for steel pipe:

	New York	Black Chicago	St. Louis
1 to 3 in. butt welded.....	38%	42.8%	40.1%
3½ to 6 in. lap welded.....	18%	38.8%	36.1%

Malleable fittings. Class B and C, from New York stock sell at list price. Cast iron, standard sizes, 15 and 5%.

SHOP SUPPLIES

NUTS—From, warehouse at the places named, on fair sized orders, the following amount is deducted from list:

	New York	Cleveland	Chicago
Current	Current	Current	Current
Hot pressed square.....	\$1.05	List	\$1.05
Hot pressed hexagon.....	.85	List	.85
Cold punched square.....	1.00	List	1.00
Cold punched hexagon.....	1.00	List	1.00

Semifinished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York.....	40%	50%
Chicago.....	50%	45%
Cleveland.....	60%	50%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
1 by 4 in. and smaller.....	30-5%	40-10%	40-10%
Larger and longer up to 1 in. by 30 in.....	30%	30-5%	35-5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

	New York	Cleveland	Chicago
For wrought-iron washers:			
New York.....	\$3.00	\$3.00	\$3.00

For cast-iron washers the base price per 100 lb. is as follows:

New York.....	\$3.50	\$3.50	\$3.50
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RIVETS—The following quotations are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ½ and smaller.....	30%	40%	40%*
Tinned.....	30%	40%	40%*

* For less than keg lots the discount is 35%.

Button heads, 1, 1½, 1 in. diameter by 2 in. to 5 in., sell as follows per 100 lb.:

New York.....	\$6.09½	\$5.85	\$5.50
Coneheads, same sizes:			
New York.....	\$6.19½	\$4.50	\$5.60

MISCELLANEOUS

GREASES—Prices are as follows in the following cities in cents per pound for barrel lots:

	Cincinnati	Chicago	St. Louis	Birmingham	Denver	Pittsburgh
Cup.....	7	5½	6.9	7½	10½	7½
Fiber or sponge.....	8	6	7.4	7½	15	7½
Transmission.....	7	6	7.4	7½	13	8½
Axle.....	4½	4	3.6	3	5	5½
Gear.....	4½	4½	7.0	7½	6	3½
Car journal.....	22 (gal.)	3½	4.5	3	6	7½

BABBITT METAL—Warehouse prices in cents per pound:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Best grade....	90.00	65.00	100.00	65.75	100.00	60.00
Commercial....	50.00	35.00	22.00	20.75	22.00	25.00

HOSE—Following are prices of various classes of hose:

	Fire		Air		50-Ft. Lengths 75c. per ft. 40c.
	First Grade	Second Grade	First Grade	Second Grade	
Underwriters' 2½-in.					
Common, 2½-in.					
1-in. per ft.	\$0.55	\$0.30			

Steam—Discounts from list

First grade	30%	Second grade	30-5%	Third grade	40-10%
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LEATHER BELTING—Present discounts from list in cities named:

	Medium Grade		Heavy Grade	
	40+5%	35%	30%	40%
St. Louis				
Denver	35%	30%		
Birmingham	35%	40%		
Chicago	30-10%	40-5%		
Cincinnati	40-10%	40%		

RAWHIDE LACING—40% off list.**PACKING**—Prices per pound:

Rubber and duck for low-pressure steam	\$0.90
Asbestos for high-pressure steam	1.65
Duck and rubber for piston packing	1.00
Flax, regular	.90
Flax, waterproofed	1.10
Compressed asbestos sheet	1.00
Wire insertion asbestos sheet	1.20
Rubber sheet	.60
Rubber sheet, wire insertion	.90
Rubber sheet, duck insertion	.50
Rubber sheet, cloth insertion	.25
Asbestos packing, twisted or braided, and graphited, for valve stems and stuffing boxes	1.10
Asbestos wick, ¼- and 1-lb. balls	.65 to .70

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York and St. Louis
Galvanized iron rigging	+20%
Galvanized cast steel rigging	List
Bright plain rigging	30%
Bright cast steel	17½%
Bright iron and iron tiller	5%

MANILA ROPE—For rope smaller than ½-in. the price is ½ to 2c. extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: ½-in., 8 ft.; ¾-in., 6; 1-in., 4½; 1¼-in., 3½; 1½-in., 2 ft. 10 in.; 1¾-in., 2 ft. 4 in. Following is price per pound for ½-in. and larger, in 1200-ft. coils:

Boston	\$0.34	Atlanta	\$0.36
New York	33	Denver	35
Cincinnati	33	Kansas City	34
Chicago	32	New Orleans	33
St. Paul	34	Seattle	33
San Francisco	31	St. Louis	33
Pittsburgh	36	Los Angeles	32

PIPE AND BOILER COVERING—Below are discounts and part of standard lists:

PIPE COVERING		BLOCKS AND SHEETS	
Pipe Size	Standard List Per Lin. Ft.	Thickness	Price per Sq. Ft.
1-in.	\$0.27	1-in.	\$0.27
2-in.	.36	1-in.	.30
6-in.	.80	1½-in.	.45
4-in.	.60	2-in.	.60
3-in.	.45	2½-in.	.75
8-in.	1.10	3-in.	.90
10-in.	1.30	3½-in.	1.05
85% magnesia high pressure		4-ply	15% off
For low-pressure heating and return lines		3-ply	58% off
		2-ply	60% off
			52% off

LINSEED OIL—These prices are per gallon:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Raw per barrel	\$1.55*	\$1.26	\$1.65	\$1.25	\$1.65	\$1.25
5-gal. cans	1.65*	1.36	1.80	1.35	1.75	1.30

WHITE AND RED LEAD in 500-lb. lots sell as follows in cents per pound:

	Red		White	
	Current	1 Year Ago	Current	1 Year Ago
	Dry	In Oil	Dry and In Oil	Dry and In Oil
25 and 50-lb. kegs	11.25	11.41	11.25	11.50
12½-lb. keg	11.47	11.62	11.50	11.75
100-lb. keg	11.02	11.19	11.75	12.00
5-lb. cans	11.82	15.25	13.25	13.50
1-lb. cans	13.72	14.62	13.25	13.50

COMMON BRICK—The prices per 1000 in cargo or carload lots are as follows:

Cincinnati	\$12.00	Birmingham	\$15.00
St. Louis, salmon	9.00	Denver	8.50

WIRING SUPPLIES—New York prices for tape and solder are as follows:

Friction tape, ½ lb. rolls	35c. per lb.
Rubber tape, ¼-lb. rolls	45c. per lb.
Wire solder, 50-lb. pools	45c. per lb.
Soldering paste, 1-lb. cans	50c. per lb.

PREPARED ROOFINGS—Standard grade rubbered surface, complete with nails and cement, costs per square as follows in New York, St. Louis, Chicago and San Francisco.

	1-Ply		2-Ply		3-Ply	
	C.I.	L.C.I.	C.I.	L.C.I.	C.I.	L.C.I.
No. 1 grade	\$1.30	\$1.55	\$1.60	\$1.75	\$1.90	\$2.05
No. 2 grade	1.15	1.30	1.45	1.60	1.75	1.90

Asbestos asphalt saturated felt (14 lb. per square) costs \$5.35 per 100 lb.

Slate-surfaced roofing (red and green) in rolls of 108 sq. ft. costs \$1.95 per roll in carload lots and \$2.20 for smaller quantities.

Shingles, red and green slate finish cost \$5.25 per square in carloads, \$5.50 in smaller quantities, in Philadelphia.

ROOFING MATERIALS—Prices per ton f.o.b. New York or Chicago:

	Carload Lots	Less than Carload Lots
Tarfelt (14 lb. per square of 100 sq. ft.)	64	65
Tar pitch (in 400-lb. bbl.)	20	21
Asphalt pitch (in barrels)	35	40
Asphalt felt	72.50	77.50

STEEL SHEET PILING—The following price is base per 100 lb. f.o.b. Pittsburgh, with a comparison of a month and a year ago:

	Current	One Month Ago	One Year Ago
	4-5	\$3.10	\$3.10

HOLLOW TILE—The price per 1000 in carload lots f.o.b. mine is as follows:

	4 x 12 x 12		8 x 12 x 12	
	St. Louis	Chicago	St. Louis	Chicago
St. Louis	\$80.00	\$137.00		
Chicago	79.00	137.00		
Denver, per ton	11.00	200.00		
Kansas City	75.00	140.00		
St. Paul	56.00	110.00		
Boston	80.00	150.00		
Birmingham	61.20	114.80		
Cincinnati	68.80	129.00		
Pittsburgh	86.50	147.10		

LUMBER—Price of yellow pine per M in carload lots:

	1-in. Rough 10 In. x 16 Ft.		2-In. T. and G. 10 In. x 16 Ft.		8 x 8 In. x 20 Ft.	
	Y.P.	Fir	Hemlock	Spruce	Y.P.	Fir
St. Louis	\$40.00	\$31.00			\$38.00	
Birmingham	30.00	33.00			28.00	
Pittsburgh	48.50	48-50			50-55	

	8 x 8-In. x 20 Ft. and Under				12 x 12-In. 20 Ft. and Under	
	Y.P.	Fir	Hemlock	Spruce	Y.P.	Fir
Boston			\$45.00			
Kansas City	\$34.50	\$38.00			\$39.00	\$40.00
Seattle	24.50	24.50	24.50	24.50	24.50	24.50
St. Paul	51.50	44.00	44.00		60.00	
Denver	37.00		33.00		40.00	
Atlanta	25.00				30.00	
San Francisco		28.00	28.00	28.00		28.00

	1-In. Rough 10 In. x 16 Ft. and Under		2-In. T. and G. 10 In. x 16 Ft.	
	Y.P.	Fir	Hemlock	Y.P.
Boston			\$35.00	
Kansas City	\$47.25	\$53.00	53.00	\$54.50
Seattle	24.50	24.50	24.50	24.50
St. Paul		39.00	38.50	50.00
Denver	37.00	32.00	32.00	32.00
Atlanta	37.00			30.00
San Francisco		28.00	28.00	28.00

COPPER WIRE—Prices per 1000 ft. for rubber-covered wire in following cities:

	Denver			St. Louis			Birmingham		
	No.	Single Braid	Double Braid	Single Braid	Double Braid	Duplex	Single Braid	Double Braid	Duplex
14	\$12.00	\$15.00	\$31.00	\$18.50	\$16.25	\$31.25	\$13.50	\$17.40	\$36.30
10	22.15	25.25	50.05	25.00	28.50	56.40	30.30	34.30	67.60
8	31.40	24.25	69.50	34.85	38.85	74.70	42.80	46.85	
6	49.40	53.30		59.75	64.25		63.60	74.10	
4	71.30	76.15		84.40	84.90		101.75	106.55	
2	108.00	113.65		125.50	132.00		151.50	163.00	
1	140.40	147.85		163.00	171.15		201.00	209.50	
0	176.85	176.85		216.00	225.00		276.00	285.00	
00		239.45		263.00	273.50		317.00	330.00	
000		298.15		320.00	331.50		417.00	428.00	
0000		357.00		388.50	400.50		508.00	516.00	

EXPLOSIVES—Price per pound of dynamite in small lots and price per 25-lb keg for black powder:

	Low Freezing 20%		Gelatin 40%		Black Powder 80%	
	20%	40%	60%	80%	Black Powder	
New York		\$0.24*	\$0.34		\$2.40	
Boston		27	34			
Kansas City		20	26			
Seattle		17½	24			
Chicago		18½	22½			
St. Paul		20	23		2.45	
St. Louis		20	24		4½	2.45
Denver		18	25½		42½	
Dallas		23	29½		37	
Los Angeles		22	28		36	
San Francisco		17½†	23½†		30½†	40½†

† In carload lots. * 25% and 75% respectively.

FREIGHT RATES—On finished steel products in the Pittsburgh district including plates, structural shapes, merchant steel, bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains, etc., the following freight rates are effective in cents per 100 lb.:

Boston	21.5	Minneapolis	35.5
Buffalo	11.6	New Orleans	30.7
Chicago	21.5	New York	19.5
Cincinnati	18.5	Philadelphia	18.5
Cleveland	13.5	St. Louis	27.0
Denver	79.0	St. Paul	40.0
Kansas City	47.0	Pacific Coast (all rail)	100.0